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# TROPICAL DISEASES BULLETIN

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL DISEASES BULLETIN.

Vol. 43.] 1946. [No. 1.

## SUMMARY OF RECENT ABSTRACTS.*

### I. CHOLERA.

#### *Epidemiology.*

ROGERS (p. 282) has collected additional data from India, which support the contention he has previously made, that epidemics of cholera can be forecast by close observation of the south-west monsoon rains of July to October. The danger of spread of cholera by pilgrims returning from a fair can be foreseen " from the climatic data at the time and a knowledge that cholera is present in the areas through which the pilgrims have to travel. . . ." Rogers concludes that as the climatic conditions are beyond human control, the only means of prevention is by protective vaccination. In the discussion which followed the reading of Rogers's paper, a speaker expressed doubt as to the value of vaccination in previous years, but thought that the vaccine now available is probably better than that previously used. Cholera, however, is amenable to improvements in environmental, domestic and personal sanitation.

In discussing the epidemiology of cholera in the Punjab, YACOB (p. 119) notes that the most recent fair, held at Thanesar in 1941, passed off without a single case, although it was attended by 500,000 pilgrims. This appears to be evidence of the efficiency of the Punjab health organization, but the author seems to think that for other pilgrim centres protective inoculation of all pilgrims is the only means that can be expected to control the epidemics.

In the Kunming epidemic of 1942, 93 per cent. of the vibrio strains isolated were of Inaba type, 7 per cent. of Ogawa type (TANG *et al.* p. 120).

#### *Aetiology.*

In a detailed study of the growth conditions of *V. cholerae*, LINTON and JENNINGS (pp. 377–78) describe a simple casein digest medium to which certain salts and glucose are added, and through which air (with a proportion of $CO_2$) is continuously bubbled. In this medium (for details of which the original abstract should be consulted), when the concentration of glucose is at the optimum (1 per cent.) the vibrios grow well, to yield a five-fold increase over previous methods, and as the *p*H is regulated by the aeration, are not destroyed by the acid formed as a result of fermentation of glucose. Cultures in this

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1945, v, 42. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

medium may be used directly as vaccines (after having been killed with phenylmercuric acetate) or for chemical and physical studies. In further work, JENNINGS (p. 806) has found that growth will occur in a medium in which starch is the source of energy for reproduction, and that if the culture is efficiently aerated, there is no accumulation of acid by-products. Sodium lactate may also be used as energy food.

BERNARD and GALLUT (p. 34) describe a method of preparing cholera toxin by growing the vibrios in a medium containing glucose. In this the vibrios multiply and ferment the glucose, there is a strong change of *p*H towards acidity, and within 4 hours most of the vibrios are dead. The massive death of the vibrios appears to be the dominant factor in the rapid diffusion of the cholera toxin. The same authors (p. 807) contend that there is only one cholera toxin, which is complex and which is produced only on the death of the vibrio. This has two components :—the glucolipidic constituent, which, they claim, produces the congestion and visceral necrosis of cholera, and whose molecule is too big to pass through a collodion sac ; and the protein-like constituent, which is non-antigenic but dialysable, and which determines the symptom of hypothermy.

GALLUT and GRABAR (p. 807) have determined the point of filtration at which the whole of the glucolipidic complex is held back but at which the rest of the total toxin is allowed to pass. The filtrate thus obtained gives the reactions of protein, but is not antigenic. The characters of the two constituents are as follows : *Glucolipidic*—(1) 80–100 m$\mu$ ; (2) neutralized by antiglucolipidic serum and by antiserum to total toxin ; (3) productive of congestion. *Toxic substance of the ultrafiltrate*—(1) 4 m$\mu$ ; (2) not neutralized by antiglucolipidic serum or by antiserum to total toxin ; (3) productive of hypothermy ; (4) probably protein in chemical composition.

BURROWS (p. 727) has recovered the endotoxin of *V. cholerae* by several methods which are named in the original abstract. The extracted material appears to be a mixture of lipids (and the endotoxin is possibly a phospholipid), contains inorganic salts, and is negative to the Molisch, Millon and biuret tests. It can consistently be obtained with a mouse m.l.d. of 30 $\mu$gm. In further work, BURROWS *et al.* (p. 727) have been able to immunize mice actively by inoculation of alcohol-saline suspension of alcoholic endotoxin, but have not succeeded in demonstrating, *in vitro*, neutralization of endotoxin by either antibacterial or anti-endotoxic sera known to be protective when tested against vibrios suspended in mucin and injected into mice.

The diarrhoea of cholera is attributed to toxic action, and BURROWS *et al.* (p. 728) have shown by experiments with intestine of freshly killed normal and immune rabbits, that there is increased permeability in the normal intestine when it is in contact with fluid containing cholera toxin, but that this does not occur with intestine from immunized animals. In the presence of a suspension of living vibrios the same effect is found, but is abolished by the addition of agglutinating serum. They argue that active immunity includes antitoxic as well as antibacterial immunity. If the resistance of the immune intestine has an antigen-antibody basis, the functional antibody may be intracellular, presumably in the macrophages of the tissues of the intestine.

FELSENFELD (p. 283) has studied the lecithinase activity of the cholera and El Tor vibrios.

### *Treatment.*

In a group of 210 cases of cholera or diarrhoea (mostly proved cholera), MISRA (p. 120) found indications that treatment with sulphaguanidine was more effective than with sulphapyridine, or phage, or calomel and salines. The last two treatments, though useful in early cases, were not reliable in late,

severe, cases. LAHIRI (p. 643) produces good evidence of the value of sulphaguanidine in the treatment of cholera in the early stages. In the series quoted the results with this drug were considerably better than those achieved with calomel or sulphathiazole, and the dosage of sulphaguanidine was not high. The use of extract of suprarenal cortex (said to control sodium metabolism and water balance), and saline transfusion, were also thought to be beneficial. It is pointed out that in late cases, treatment resolves itself into the combating of dehydration.

SEN and BASU (p. 893) have found that there is, *in vitro*, a synergistic action between sulphanilyl benzamide and cholera phage against the cholera vibrio, and suggest that a combination of the two might be useful in the treatment of cholera.

Having observed that atebrin is bacteriostatic to *V. cholerae* in high dilution, and that its intragastric administration to infected guineapigs has a marked curative effect, PANJA (p. 892) treated 20 human cases of cholera with 4 to 6 tablets (presumably each of 0·1 gm.) given on one day, sometimes followed by others the next day. Hypertonic saline was also administered. Nineteen of the patients survived, which, in view of their serious condition, is a promising result.

PAUL and CHATTERJEE (p. 379) show that pyrexia is produced in cholera patients subjected to intravenous saline infusions if these contain pyrogenic substances or if they are more acid or alkaline than the blood can buffer.

### *Vaccination.*

GRIFFITTS (p. 284) has adopted a mouse protection test to estimate the effect of vaccination against cholera with Inaba and Ogawa strains in equal amounts. Protective substances appear in the serum in one week after vaccination, are more concentrated in the first month than at 3 or 6 months, but are still present at 18 months. "No definite correlation between height of agglutinin and mouse protective titers could be made."

In a discussion of the mouse protection test for cholera vaccine, RANTA and DOLMAN (p. 467) make the following points. In mice, vaccination by two spaced doses is better than by a single dose, and is as good as vaccination by three spaced doses. The degree of Inaba-Ogawa cross-protection in mice is sufficiently high to eliminate the need for challenging with both type strains. The protection afforded is apparently not merely local to the tissues at the site of injection. Vibrios suspended in mucin are used to test the immunity.

*Charles Wilcocks.*

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## MALARIA.

JARCHO, S. **Contemporary Tendencies in the History of Malariology.** *Bull. History of Med.* Baltimore. 1944, Nov., v. 16, No. 4, 389–98. [32 refs.]

In an interesting paper the author examines the history of malariology in the recent past, and its present trends, and speculates as to the developments that can be expected in the immediate future. Assuming that the ultimate objective of malariology is the eradication of the disease, one is forced to admit that but little progress has been made toward the attainment of that goal despite vast acquisitions of knowledge. "All evidence points to immunology as the field which at the present time offers greatest opportunity for fruitful research and greatest hope for the ultimate eradication of the disease."

*Norman White.*

MOORE, L. D. **Incidence of Malaria among Troops in Liberia.** *J. National Malaria Soc.* Tallahassee, Fla. 1945, June, v. 4, No. 2, 109–13.

The first contingent of U.S. troops arrived in Liberia in June 1942. Coloured troops outnumbered white by five to one. They were stationed in a highly malarious area; *Anopheles gambiae* was very prevalent. Between 80 and 90 per cent. of the indigenous infants harboured parasites, all *Plasmodium falciparum*, and half of these infants harboured gametocytes. The first echelon was replaced by a second in March 1943, when the ratio of black to white troops decreased to three to one.

The first echelon was given suppressive quinine for the first five months of their stay; between 50 and 75 per cent. took it regularly, 40 grains a week. The incidence of malaria was 38·8 per cent. initial attacks, 16·0 per cent. subsequent attacks, a total of 54·8 per cent. attacks of malaria during a period of 8 months.

The second echelon lived under much better sanitary conditions but received no suppressive treatment for the first four months after arrival. They had much higher malaria rates. For a six month period the initial attack rate was 86·3 per cent., subsequent attacks 58·1 per cent., or a total malaria attack rate of 144·4 per cent. *Norman White.*

DAS GUPTA, B. M. & SIDDONS, L. B. **The Parasitology of Malaria among Destitutes in Calcutta during and after the Bengal Famine of 1943.** *Indian Med. Gaz.* 1945, Mar., v. 80, No. 3, 160–64, 4 figs.

During the disastrous famine in Bengal in 1943, large numbers of destitute persons found their way to Calcutta mainly from the neighbouring districts, 24-Parganas, Hooghly and Midnapur. Between September 1943 and December 1944 the blood of 14,862 of these destitutes was examined. Malaria parasites were found in 4,920 (33·1 per cent.). The maximum incidences occurred in December 1943, 44·0 per cent., and in November 1944, 51·7 per cent. *P. falciparum* was responsible for 48·8 per cent. of the infections, *P. vivax* 49·7 and *P. malariae* for only 1·4 per cent. This incidence of *P. malariae* infections is unusually low for Bengal; it usually amounts to 12 per cent. or more. *P. vivax*, on the other hand, was more in evidence than is usual in Bengal. The minimum malaria incidence was in June, two months later than normal. The *P. vivax* curve was unusual; it rose steadily from November 1943 to August 1944, 4 or 5 months later than the normal peak. The *P. falciparum* curve corresponded closely to that of total malaria. The undue prevalence of *P. vivax* may have been due in part to more frequent relapses than normally occur among the indigenous population; malnutrition and inadequate treatment occasioned by the shortage of antimalarial drugs may have been responsible for this. *Norman White.*

BRUMPT, E. Anophélisme sans paludisme et régression spontanée du paludisme. [**Anophelism without Malaria and Spontaneous Regression of Malaria.**] *Ann. Parasit. Humaine et Comparée.* 1944–45, v. 20, No. 1–2, 67–91. [Numerous refs.]

This interesting dissertation is concerned with the large amount of work that has been done to explain the phenomena of anophelism without malaria and the spontaneous disappearance or diminution of malaria incidence, more especially in temperate areas of Europe. A critical study of this kind does not lend itself to summary but some of its conclusions can be briefly stated.

Malaria in certain areas of Euope has often disappeared without any material alteration of conditions of housing, of agricultural methods, of conditions of

life generally and in spite of the persistence of numerous anophelines. In other areas malaria has disappeared as a result of a change in agricultural methods, the elimination of saline surface water and the diminution of mosquito breeding places. Such methods have failed in other places where certain species of *anopheles*, or biotypes (*labranchiae, elutus*), have been present. In places where malaria has disappeared and in which the abundant *A. maculipennis* present are biotypes that are but little attracted by man, the regression has often begun by a diminution in the number of gamete carriers, in part attributable to the use of quinine. In some such places malaria has reappeared when fresh gamete carriers have been introduced in the population. Numerous cases of locally acquired malaria, in areas which had been long free from the malaria which formerly afflicted them, have been reported in France and elsewhere during the two great wars, some in the neighbourhood of prisoner of war camps. *Norman White.*

YOUNG, M. D., STUBBS, T. H., MOORE, J. A., EHRMAN, F. C., HARDMAN, N. F., ELLIS, J. M. & BURGESS, R. W. **Studies on Imported Malarias: 1. Ability of Domestic Mosquitoes to transmit *vivax* Malaria of Foreign Origin.** *J. National Malaria Soc.* Tallahassee, Fla. 1945, June, v. 4, No. 2, 127–31.

In Columbia, S.C., San Francisco and Longview, Texas, special laboratories have been collaborating in an experiment to determine the capacity of American vector species (*Anopheles quadrimaculatus* Say and *Anopheles maculipennis freeborni* Aitken) to transmit strains of *P. vivax* imported from overseas.

One hundred and sixty lots of mosquitoes were fed on 151 patients suffering from relapsing *P. vivax* malaria. The probable origin of the infections studied was Guadalcanal 96, New Guinea 33, other South Pacific areas 7, Mediterranean area 18 (Africa 9, Europe 9), and Trinidad 6. The percentage of lots infected according to origin of infection was Pacific area 68, Mediterranean area 67, South America 67. Among the infected lots the total number of infected *A. quadrimaculatus* was 959 out of 2,489 dissected, or 38·5 per cent. Infected *A.m. freeborni* numbered 1,358 out of 2,581 dissected, or 52·6 per cent.

Infected mosquitoes were applied to neurosyphilitic patients. From 32 imported malaria cases transmission to 59 white patients was attempted; 21 of the strains produced infections in 43 patients.

The conclusion is that imported strains of *P. vivax* malaria can be spread by local species of *Anopheles* in the United States just as readily as indigenous strains of malaria. *Norman White.*

CHWATT, L. J. **The Morphology of the Pharyngeal Armature in *Anopheles gambiae* and *Anopheles gambiae* var. *melas* from Southern Nigeria.** *Ann. Trop. Med. & Parasit.* 1945, Oct. 10, v. 39, No. 2, 124–8, 3 figs. [12 refs.]

Attempts to separate *Anopheles gambiae* type form from its variety *melas* (raised to specific rank by RIBBANDS in 1944) [this *Bulletin*, 1945, v. 42, 3] are still a matter of considerable uncertainty. Of all the characters and methods of differentiation so far tested the least unsatisfactory is based on the structure of the egg.

Material from Lagos identified in this way as containing thirty-five *A. gambiae* and twenty-five *A. gambiae* var. *melas* was prepared for microscopic examination of the bucco-pharyngeal armatures. Comparison showed that there are no determinable and consistent differences between the two forms and that individual variations are extremely small. A full description of the bucco-pharyngeal armature of *A. gambiae* is given and illustrated. [See also this *Bulletin*, 1945, v. 42, 860.] *H. S. Leeson.*

STONE, A. **Some Relationships of *Anopheles lungae* Belkin and Schlosser (Diptera : Culicidae).** *J. Wash. Acad. Sci.* 1944, Aug. 15, v. 34, No. 8, 273.

*Anopheles lungae* Belkin and Schlosser is closely related to *A. tessellatus* Theo., and to *A. longirostris* Brug. Characters are given for separating the females. The larva of *A. lungae* is distinguishable from that of *A. tessellatus*, but as yet no differences from that of *A. longirostris* have been observed.

The three species have characters in common which distinguish their adults and larvae from those of *A. punctulatus* Dön, *A. annulipes* Walker, *A. farauti* Lav. and *A. amictus* Edw.

*A. tessellatus* occurs from India to Hong Kong, in the Netherlands Indies and the Philippines, with a few records from the Moluccas and a doubtful one from New Guinea. *A. longirostris* has been taken from New Guinea and New Ireland. *A. lungae* is confined to the Solomons. The distribution of these three species is not known to overlap. *H. S. Leeson.*

OWEN, W. B. **A New Anopheline from the Solomon Islands with Notes on its Biology.** *J. Parasitology.* 1945, Aug., v. 31, No. 4, 236–40, 2 pls.

The female, male and larva (but not the egg or the pupa) of a new species, *Anopheles koliensis*, are described from material collected along the north coast of Guadalcanal in the Solomon Islands. The description is based on fifty caught females and their 500 progeny (300 females and 200 males) and several hundred other specimens. Of 500 females caught in tents over several weeks 90 per cent. were *koliensis*, 5·8 per cent. were *farauti* and 4·2 per cent. were *punctulatus*. During the same period 10 per cent. of the total anopheline larvae collected were *koliensis* ; indicating that the new species has a greater preference for entering human habitations than the other anophelines, and thus is " of primary importance in disease transmission."

Morphologically *koliensis* lies between *A. punctulatus* and *A. farauti* and the distinguishing characteristics are discussed ; adult and larval features of the new species are illustrated.

[Because of the obscurity of the taxonomic relationships of the *punctulatus* group it remains to be seen whether *koliensis* and *moluccensis* are identical. In this important complex group the following " species " have now been named *A. punctulatus, moluccensis, farauti, koliensis.*] *H. S. Leeson.*

BELKIN, J. N., KNIGHT, K. L. & ROZEBOOM, L. E. **Anopheline Mosquitoes of the Solomon Islands and New Hebrides.** *J. Parasitology.* 1945, Aug., v. 31, No. 4, 241–65, 27 figs. on 3 pls.

The anophelines dealt with in this paper are *Bironella* (*Brugella*) *hollandi* Taylor, *Anopheles* (*Myzomyia*) *solomonis* n. sp., *A.* (*M.*) *lungae* Belkin and Schlosser, *A.* (*M.*) *punctulatus* Doenitz, *A.* (*M.*) *farauti* Laveran and *A.* (*M.*) *koliensis* Owen.

Keys to the identification of females, males, pupae and fourth-stage larvae are given, but the authors consider that the key to the males is not entirely satisfactory. Detailed descriptions follow the keys, though the only egg described is that of *B. hollandi*. Taxonomy, distribution and biology of each species are discussed.

The new species *A. solomonis* appears to be closely related to *A. lungae*. Both occur in Guadalcanal, the latter occurs also in New Georgia and Bougainville and the former (doubtfully) in New Georgia. Larvae and pupae of both species have the habit of working their way out of the water on to leaves and banks, and they cannot be distinguished in the field. Little is known of the

habits of *A. solomonis* adults, but *A. lungae* rests by day on tree trunks in swampy jungle; two or three hundreds have been collected from one tree. They do not attempt to bite when disturbed, but return immediately to their resting place. Activity begins about 6.30 p.m. and in an hour all adults are on the wing. About 6.30 a.m. they have all settled down again. In the Lunga area of Guadalcanal, *A. lungae* formed about 2 per cent. of the total night catches for over a year, the remainder being *A. farauti*. No *A. lungae* were taken in native villages, and other evidence confirms that this species is not attracted to man.

*A. punctulatus*, *A. farauti*, *A. koliensis* and *A. moluccensis* form a closely related series in the group *Neomyzomyia*, though the exact relationship of *moluccensis* to *farauti* and *koliensis* is not clear.

[In 1944, KNIGHT and FARNER (this *Bulletin*, 1945, v. 42, 688) produced evidence to show that the form of *A. punctulatus* Doen. known as *moluccensis* Sw. and Sw. in the New Hebrides should be designated *A. punctulatus farauti* Lav. It was the only form seen there. Whether *moluccensis* and *farauti* are identical or not they were unable to say, but expected that this would prove to be the case. LEVER (this *Bulletin*, 1945, v. 42, 778) also refers to the paper by LAVERAN published in 1902 and considers that the chief vector of malaria in Melanesia hitherto known as *A.* (*M.*) *punctulatus* Dön. *moluccensis* Sw. and Sw. must now be referred to as *A.* (*M.*) *punctulatus* Dön. *farauti* Lav.].

The present authors prefer to regard *A. punctulatus*, *A. farauti* and *A. koliensis* as species, and not as subspecies of *A. punctulatus* because they can distinguish them in the adult, pupal and larval stages. They also regard *A. farauti* Laveran 1902 as the *A. punctulatus* of Buxton and Hopkins 1927, Paine and Edwards 1929 and Senevet 1931.

In the Solomons, *A. punctulatus*, *A. farauti* and *A. koliensis* all occur on Guadalcanal; *A. punctulatus* and *A. farauti* both occur on Bougainville; *A. farauti* occurs in other islands of the Solomons group and also in several islands of the New Hebrides.

*A. punctulatus* is not so common as the other two species and, though it feeds readily in captivity, does not appear to attack man often in nature in Guadalcanal. *A. farauti* is the commonest species and formed 98 per cent. of the anophelines taken in routine night catches in north-west Guadalcanal during a period of over a year. Its normal feeding time is from dusk to dawn, but it will attack man in the daytime in shaded places. It is the principal anopheline attacking man except in the Koli area of Guadalcanal, where its place is taken by the strongly anthropophilic *A. koliensis*. *H. S. Leeson.*

LEVI-CASTILLO, R. *Anopheles pseudopunctipennis* **in the Los Chillos Valley of Ecuador.** *J. Econom. Entom.* 1945, June, v. 38, No. 3, 385–8, 3 figs.

ZUKEL, J. W. **Marking Anopheles Mosquitoes with Fluorescent Compounds.** *Science.* 1945, Aug. 10, 157.

Anthracene, rhodamine B and fluorescein have been used for marking *Anopheles maculatus*; they produce blue, red and green fluorescent colours respectively which can be seen under ultraviolet light. Anthracene can be used either as an aerosol or as a dust mixed with gum arabic; exposure of the mosquitoes to an aerosol concentration of 10 mgm. per litre of air produces a homogeneous deposit of particles (average size 6·7 microns) on them which is apparently harmless. For use as a dust, anthracene 1 part and gum arabic 2 parts are mixed in water, the mixture evaporated to dryness and ground to a powder; the mosquitoes are dusted with the powder and then placed in an atmosphere of saturated humidity for 15 minutes. The gum arabic prevents contamination of unmarked specimens during the subsequent collection.

Rhodamine B and water-soluble fluorescein are used as dusts made in the same way in the proportion of 10 mgm. of dye to 3 gm. of gum arabic.

Large numbers of mosquitoes (or other insects) can easily be marked and the identification of the marked specimens in the collections examined under ultraviolet light is rapid. *J. F. Corson.*

SHUTE, P. G. **Clinical Observations on Malaria.** *Post-Graduate Med. J.* 1945, Aug., v. 21, No. 238, 253–61, 10 charts.

An exceptionally clear and succinct account of the clinical features of the different forms of malaria, which deserves to be read by every medical man in Britain, since malaria is likely to be common in returned soldiers. A student of tropical medicine could well base his future reading on this paper, which obviously embodies the author's wide and careful personal observations.

*Charles Wilcocks.*

RAPER, A. B., WILSON, Margaret E. & WILSON, D. B. **Dividing Forms of *Plasmodium falciparum* in the Peripheral Blood of Africans.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1945, Mar., v. 38, No. 4, 291–5.

Three cases of malignant tertian malaria are described in African natives, in which dividing forms and mature schizonts appeared in the peripheral blood without there being any indication that the infection was running a particularly severe course. In two cases the patients were semi-immune in that they came from districts where malaria transmission takes place for a short period each year. Both these cases might have become seriously ill if treatment had not been carried out. The treatment, however, was of moderate intensity and this sufficed to bring about a clinical cure. The third case was in a fully immune individual. No treatment was given and the patient never became dangerously ill. The temperature dropped to normal on the fifth day, all parasites disappearing from the blood by the seventh day. In this case the patient had been absent from his home for two years, during which he was exposed to little if any infection. Exposure to a strain of *Plasmodium falciparum* different from the one to which he had been accustomed then took place. The dividing forms and schizonts of *P. falciparum* in these three cases were of the usual type. It is suggested that there may be a race or strain of the parasite in which peripheral schizogony occurs, or that a reticulo-endothelial system overloaded from any cause may allow schizonts to overflow into the general circulation without the grave complications usually associated with their occurrence.

*C. M. Wenyon.*

PROKOPENKO, L. I. [**Parasite Carriage and Duration of Malignant Tertian Malaria in Middle Asia.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1945, v. 14, No. 1, 45–63, 1 fig. [In Russian.]

An account is given of epidemiological and parasitological observations on malaria made by the author between 1942 and 1944 in three collective estates of Uzbekistan (Middle Asia), where severe outbreaks, affecting almost 100 per cent. of the population, occurred in 1942.

In February 1943 it was found that, as the result of the epidemic, 10 per cent. of the population were extremely debilitated and anaemic, with protein-deficiency oedema of the face and extremities, while more than 3 per cent. had an enlarged thyroid. The spleen rate was from 19·5 to 24·5, while the parasite rate varied from 40·4 to 59·3. The predominant form of malaria was malignant tertian (383 in 1,094 persons examined, or 35 per cent.), with a high proportion

of mixed infections of this and benign tertian, while the number of quartan cases was negligible. Between May and October 1942 the entire population of the estates underwent several courses of curative treatment with acriquine [mepacrine] and plasmocide [pamaquin], followed by suppressive treatment.

In addition to this, a number of minor hydrotechnical improvements were carried out, resulting in a considerable decrease of mosquito-breeding places. In spite of intense treatment, which brought about a considerable fall in the spleen and parasite rates, the percentage of persons harbouring parasites remained high (5–7 per cent. of the population in summer, when the rates were lowest).

The total number of persons kept under observation was 1,143, of whom 801 showed parasites. The majority of these (61·3 to 97·7 per cent.) were symptomless carriers; paroxysms of fever occurred only in a small minority. The author concludes that carriers represent the main sources of infection leading to epidemic outbreaks in Middle Asia. Their rôle as the reservoir is further enhanced by the fact that 93·1 per cent. of malignant tertian cases harboured gametocytes. Findings of parasites in the same individuals, examined from 4 to 9 times, were distributed as follows: once in 67·6 per cent. of cases of malignant tertian and in 67·5 per cent. of benign tertian; twice in 24·7 per cent. of cases of malignant tertian and in 25 per cent. of cases of benign tertian. More than 60 per cent. of the repeated findings were made in the new epidemic season and presumably represented reinfections. It was also found that the duration of the infection was longer and reinfections were more common in debilitated, underfed persons than in those whose diet was normal. Estimates of the duration of malignant tertian malaria, based on the data of mass observations, showed that the infection usually lasted 10–12 months. *C. A. Hoare.*

NORONHA, A. J. **Atypical Malarial Gametocytes in the Peripheral Blood.** *Indian Med. Gaz.* 1945, June, v. 80, No. 6, 298, 6 figs. on 1 pl.

LAHA, P. N. **Malarial Nephritis (with Two Illustrative Case Reports).** *Indian Med. Gaz.* 1945, v. 80, No. 3, 135–7.

The author refers to recently published reports on malarial nephritis and gives detailed clinical notes of two cases. A Hindu boy, aged 10, had the characteristic symptoms and signs of nephritis, with ascites and oedema. The manner in which the symptoms yielded to small doses of quinine, after other treatment had failed to give any alleviation, affords presumptive evidence that malaria was the cause of the nephritis. In the second case the rôle of malaria as the primary cause of nephritis was not so convincingly demonstrated. A definite temporary improvement in the patient's general condition followed the administration of quinine, but the urine showed no sign of this improvement and uraemic coma was responsible for death a month later. *Norman White.*

YAN TIM WONG. **The Measurement of Blood Oxygen in Malaria with the Use of the Oximeter.** *Science.* 1945, Sept. 14, 278–9, 1 fig.

This preliminary note deals with the determination of blood oxygen levels at the time of the paroxysm in ten white subjects undergoing malarial therapy with *P. vivax*; Millikan's oximeter (see below) was used for the purpose of giving a continuous record of the percentage oxygen saturation of haemoglobin in the blood. Coloured patients were found to be unsuitable because of the fact that their skin pigment decreased the amount of light reaching the photoelectric cells and rendered the method less sensitive. Each patient acted as his own control, as similar records of oxygen saturation of the blood were made

before inoculation with malaria. The results for each patient were approximately the same before and after inoculation, but varied widely in different patients, according to whether they were of an active or lethargic type. During the cold stage of the paroxysm when the patient was cyanosed, the oxygen saturation increased slightly as a result of hyperpnoea. The percentage oxygen saturation then gradually fell as the temperature rose and the extent of the fall was proportional to the severity of the paroxysm—the lowest record showed a 70 per cent. saturation. The reduction in degree of saturation was not compensated by breathing pure oxygen even when accompanied by the intravenous injection of 300–600 cc. red blood cells. During a mild paroxysm the changes in saturation recorded were very small. As the temperature fell, the degree of saturation increased and reached a normal value before the temperature. In some patients the instrument was painfully irritating, especially during the paroxysm, and small doses of codeine had to be administered.

The paper by MILLIKAN (*Rev. Sci. Instruments*, 1942, v. 13, 434) describing the oximeter, contains the following paragraph :—" The oxygen saturation of arterial blood in man can be measured continuously *in situ* by means of bichromatic photo-electric colorimetry of the intact fully flushed ear. The accuracy of the device as determined by gas analysis of arterial blood samples is from 3 to 8 per cent. [The term " accuracy " would appear to be more correctly rendered as " error."] The entire optical and photo-electric system, comprising a miniature lamp bulb, two color filters, and two selenium barrier-layer photo-cells, weighs 30 grammes, and slips over the shell of the ear. One of the color filters transmits a wave-length band which is equally absorbed by oxy- and reduced hemoglobin, thus providing a means of measuring the amount of total hemoglobin in the optical path, independent of its degree of oxygen saturation. The other color is very differently absorbed by the two hemoglobin forms. Several direct reading forms of the instrument are discussed."]

*J. D. Fulton.*

NAPIER, L. E. **The Present Status of Antimalarial Drugs.** *New England J. of Med.* 1945, July 12, v. 233, No. 2, 38–43. [15 refs.]

In an interesting paper the author describes recent additions to our knowledge regarding the use and relative value of anti-malarial drugs. The conclusions reached are stated as follows :—

" Prior to 1942, atabrine was looked on as a valuable addition to the armamentarium of the physician for the cure and suppression of malaria, but its place was certainly second to that of quinine. Recent work has shown that it is probably the most valuable drug in the fight against malaria.

" Despite the fact that quinine and the other cinchona alkaloids have had to take a place below atabrine on the antimalarial priority list, recent work has in no way questioned their efficacy. On the contrary, it has confirmed previous work regarding the antimalarial activity of all the crystalline alkaloids, and more especially that of a mixed alkaloidal preparation, which in some of the poorer malarious countries may, on economic grounds, still prove to be the drug of choice for the mass of the population.

" The strict limitations of plasmochin in the treatment of malaria have long been recognized, and recent experience has merely served as a reminder of these limitations. It is, however, the only drug that acts as a true causal prophylactic or actually prevents relapses in benign tertian malaria, albeit in large and dangerous doses. These unique properties should be recognized and, in special circumstances, full advantage taken of them. Furthermore, it seems possible that by a modification of the formula of plasmochin a less toxic but equally efficacious drug may be synthesized. The discovery of such

a drug will give man a weapon with which he will be able to control malaria not only in the individual but in the community. Although it is improbable that malaria will ever be banished by the use of drugs alone, with a drug possessing these properties it may be possible to control it in some communities where this was hitherto impossible, and in others to do so more effectively and at lower cost than would be possible by any other means. Until, however, such a drug is discovered no claim for man's mastery over malaria can be made." *Norman White.*

OLDHAM, Frances K. & KELSEY, F. E. **Studies on Antimalarial Drugs. The Distribution of Atabrine in the Tissues of the Fowl and the Rabbit.** *J. Pharm. & Exper. Therap.* 1945, Apr., v. 83, No. 4, 288–93. [10 refs.]

A study was made of the concentration of mepacrine (atabrine) in the tissues of the fowl and rabbit at various periods after single or repeated intravenous doses. The two species of vertebrate behaved somewhat differently, especially in that mepacrine was more rapidly eliminated from the fowl than from the rabbit. When a dose of 5 mgm. mepacrine per kgm. was given to rabbits intravenously, the concentrations at 1 hour later were :—Lung, 72 mgm. per kgm. ; kidney, 66 ; spleen, 46 ; adrenal, 32 ; liver, 20 ; brain, 15 ; and muscle 3 mgm. per kgm. When the sizes of the organs are taken into account, it is seen that the liver stores the greatest amount of mepacrine. In the chick, little mepacrine is stored in the lungs, and with the exception of the liver all the organs store less mepacrine than those of the rabbit. Mepacrine is three times as toxic for rabbits as it is for fowls. In three rabbits which were pregnant it was found that mepacrine crosses the placenta, and may become stored in the foetus. Thus, when the liver of the mother contained 23 mgm. per kgm., the concentration in the liver of the foetus was about 3 mgm. per kgm.

*F. Hawking.*

JAILER, J. W. **Fluorescent Microscopic Study of the Physiological Distribution of Atabrine.** *Science.* 1945, Sept. 7, 258–9.

SHANNON *et al.* (*J. Pharm. & Exper. Therap.*, 1944, v. 81, 307) showed by chemical determinations that atabrine [mepacrine] is localized chiefly in the leucocytes, liver, spleen and kidney. The present author has used the fluorescence microscope to discover what parts of these tissues contain the drug.

The source of light was an H–4 bulb with a Corning No. 5984 filter in front of it and a Corning No. 3894 filter in the eyepiece of the microscope ; glass lenses were used, the wave-length of the transmitted fluorescence being 365 m$\mu$.

Frozen sections from fresh or fixed (formalin) tissue were mounted in saline or 0·2 M $Na_2HPO_4$ (atabrine shows greatest fluorescence at $p$H 9·5 in aqueous solution).

Adult mice were given intraperitoneal injections of a 2 per cent. solution of atabrine hydrochloride, 2 mgm. daily up to totals of 4 to 12 mgm. ; uninjected mice were controls. The tissue of normal mice shows a slight yellowish fluorescence diffused throughout the section and barely visible at high magnifications (440×), while the fluorescence of atabrine is yellowish-green and so much more intense that the yellowish background becomes invisible.

In the liver the fluorescence was diffusely distributed throughout the parenchymal cells, there was little in the Kupffer cells, and the sinusoids appeared black ; in the spleen the fluorescence was chiefly seen in the Malpighian corpuscles, with very little in the sinusoids. This suggests that there was little atabrine in the reticulo-endothelial cells. In the kidney most fluorescence was

seen in the convoluted tubules, less in the collecting tubules, and little in the glomeruli. Other organs showed less fluorescence.

As no distinction can be made between atabrine and its degradation products by this method, it is unknown whether the fluorescence was entirely given by atabrine. *J. F. Corson.*

MARKSON, J. L. & DAWSON, J. **Investigations in the Chemotherapy of Malaria in West Africa. IV. Report on a Case of Acute Mepacrine Poisoning.** *Ann. Trop. Med. & Parasit.* 1945, Oct. 10, v. 39, No. 2, 117–18.

A European soldier, aged 29, who had been taking suppressive doses of mepacrine for 16 months, swallowed, in a fit of mental depression, about 250 tablets (25 gm.) in one dose. He began to vomit after ten minutes and vomited 10 to 14 times, and the vomiting was soon followed by diarrhoea. He then became weak and drowsy. When seen by the medical officer, three hours after taking the mepacrine, he was collapsed and could just be roused. His stomach was washed out, a yellow fluid being returned, and he was admitted to hospital at 11.45 p.m., about four hours after swallowing the tablets.

*Conditions on admission.*—He was collapsed and stuporose; temperature 97·8°, pulse (barely perceptible) 80, respirations 22; skin cold and clammy; no jaundice and the skin, mucosa and conjunctiva not very yellow; cardiovascular and respiratory systems normal; liver and spleen normal on physical examination. He was drowsy, resented being moved, and could not answer questions; pupils contracted, reacted to light; all tendon reflexes active, abdominal reflexes present, plantar reflexes flexor.

He was given 15 minims of 1/1,000 adrenaline intravenously and gradually improved; his blood pressure an hour later was 150/100. An intravenous injection of 5 mgm. of riboflavin was given as a possible antidote to mepacrine, and two pints of 30 per cent. glucose saline were given in four hours by intravenous drip. By the following morning he had recovered and he had no further symptoms.

*Laboratory examinations.*—Blood and cerebrospinal fluid were taken one hour after adrenaline had been given and before the glucose saline. Laboratory examinations gave the following results: haemoglobin 14 gm. per cent., erythrocytes, 4,200,000, leucocytes 18,000—polymorph. 82 per cent., lymphocytes 14 per cent., mononuclears 4 per cent.—packed red cell volume 42 per cent., blood urea 25 mgm. per 100 ml., blood sugar 90 mgm. per 100 ml., plasma bilirubin 0·5 mgm. per 100 ml., plasma mepacrine 906$\gamma$ per litre. The cerebrospinal fluid contained no mepacrine. The urine contained no albumin, bile sugar or acetone.

The plasma mepacrine was 183$\mu$ per litre on the third day and 90$\mu$ per litre on the fifth day; the total urinary mepacrine excreted in 24 hours was 2·7 mgm. on the third day and 1·2 mgm. on the fifth day.

Obviously, much mepacrine was absorbed and the quick recovery of the patient shows the low toxicity of the drug. *J. F. Corson.*

FEDOTOV, P. I. **On the Antirelapse Treatment of Benign Tertian Malaria.** *Med. Parasit. & Parasitic Dis.* Moscow. 1944, v. 13, No. 6, 54–7. [In Russian.]

The author reports satisfactory results of anti-relapse treatment of B.T. malaria, consisting of a minimum of three courses, each in three cycles of 5, 3 and 3 days, with intervals of 10 days between the cycles, and of about one month between the courses. The daily doses are as follows: First course—0·3 gm. acriquine [mepacrine]; second and third courses—0·2 gm. acriquine+0·04 plasmocide [pamaquin]. In a group of patients treated according to this

scheme only 3·5 per cent. relapsed, as compared with 25 per cent. and 15·6 per cent. who had one and two courses of treatment respectively. In untreated control groups, relapses occurred in from 25·8 to 98·6 per cent.

*C. A. Hoare.*

PODLESKER, A. El cloruro de calcio en el tratamiento de las esplenomegalias palúdicas. [**Calcium Chloride in the Treatment of Malarial Splenomegaly.**] *An. Policlin. Enf. Infecciosas del C. A. Videla, Hospital F. J. Muñiz.* Buenos Aires. 1942–44, No. 4, 164–210, 15 graphs & 3 figs. [28 refs.] English summary (9 lines).

Clinical notes and haematological studies of a series of patients suffering from chronic malaria with enlargement of the spleen demonstrate the value of chloride of calcium in the treatment of the condition. An intravenous injection of 10 cc. of a 10 per cent. solution of calcium chloride is given on each of five successive days. The injections are given slowly. There is an almost immediate response by the contraction of the enlarged spleen and an amelioration of the associated symptoms. Malarial parasites that have harboured in the spleen are discharged into the peripheral blood stream and so rendered vulnerable to antimalarial drugs.

The claims advanced for this method of treatment are similar to those put forward by advocates of Ascoli's method. [See also this *Bulletin*, 1943, v. 40, 13.]

*Norman White.*

BRUETSCH, W. L. **The Public Health Aspect of Malaria Therapy of Neurosyphilis.** *Amer. J. Syph.* 1945, Sept., v. 29, No. 5, 494–505. [51 refs.]

ARCH. INST. PASTEUR D'ALGÉRIE. 1944, Dec., v. 22, No. 4, 380–82. Réglementation de la lutte antipaludique dans l'Empire français. [**Organization of the Malaria Campaign in the French Empire.**]

ANANIAN, S. A., CHUBKOVA, A. I., AZIZIAN, A. A. & KOCHARIAN, A. A. [**Intermittent Irrigation of Rice Fields as a Prophylactic and Agrotechnical Measure for Malaria Control in Armenian SSR.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1945, v. 14, No. 1, 36–45, 3 figs. [In Russian.]

The authors describe the results of experiments designed to determine the best method of intermittent irrigation of rice fields as a measure for the control of mosquito breeding. The experimental fields situated in the Armenian republic (Caucasus), were divided into a number of plots, some of which served as controls and were irrigated continuously, while in others periods of flooding, lasting 8–12 days, alternated with periods of drying, lasting 4, 5 or 6 days. It was found that drying the field 4 days is not long enough to destroy the mosquito larvae. The most satisfactory method is to dry the field for 5 days and then flood it for 8 days. This results in 0·3 per cent. mosquito production as compared with that in control plots. Prolongation of the period of irrigation is undesirable since it enables the mosquitoes to complete their development. Though the method of intermittent irrigation somewhat lowers the output of rice, it results in an economy of 32·8 per cent. of water consumption which can be used for irrigating additional plots under rice.

*C. A. Hoare.*

PARKER, W. V. & JOHNSON, H. A. **A Universal Type Concrete Slab for Precast Ditch Linings.** *Pub. Health Rep.* Wash. 1945, May 25, v. 60, No. 21, 582–7, 14 text figs. & 2 figs. on 2 pls.

The concrete slab that has proved useful in the lining of ditches of various sectional shapes measures 12 by 24 by 2 inches. It is made with a 1 : 2 : 4

mixture of cement, sand and 3/8 inch graded gravel mixture. All four edges of the slab are of the tongue-and-groove type. On the long sides of the slab the tongue on one edge and the groove on the other are formed on edges which are at an angle of 67½° with the slab surface. The end tongues and grooves are formed on edge surfaces that are at a 90° angle with the slab surface. Figures

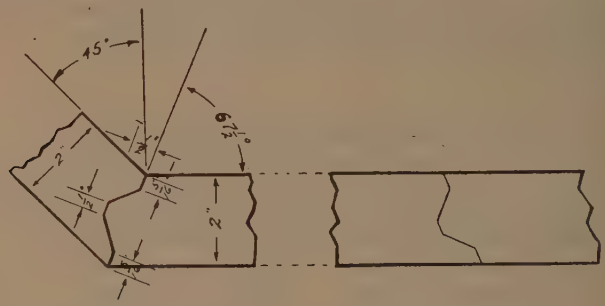


FIG. 11 FIG. 12

Details of the joint between concrete slabs laid to make a 135° angle (fig. 11) or a 180° angle (fig. 12).

[Reproduced from *Public Health Reports*, Washington.]

depict the various forms of ditch lining that are possible with this universal slab. The form of joint between the slabs delays the penetration of vegetation through the joints. Details of construction and of ditch lining are clearly described and well illustrated. *Norman White.*

PRICE, M. M. & LYMAN, F. E. **Second Report on the Control of** *Anopheles quadrimaculatus* **Say in the Water-Chestnut Areas of the Potomac River, 1944.** *Pub. Health Rep.* Wash. 1945, Aug. 24, v. 60, No. 34, 985–94, 2 figs.

The control of *A. quadrimaculatus* breeding in the Potomac River, where water-chestnut provides very favourable conditions for such breeding, was successfully effected in 1943 by airplane dusting with Paris green [this *Bulletin*, 1944, v. 41, 1007]. The presence of numerous malaria carriers in the military forces at Fort Belvoir and the Quantico Marine Barracks during 1944 made a continuation of effective control still more important. The amount of airplane dusting in 1944 was greatly reduced by extensive cutting of the water-chestnut which was begun in May. Early cutting prevents reseeding for growth the following year. Once cut, the freed plants tend to aggregate into floating mats which are favourable to mosquito breeding until the plants are washed up on shore or swept out into the river : such temporary breeding was controlled by dusting from boats. Airplane dusting in 1944 was necessary only in the neighbourhood of two of the six military establishments, Fort Belvoir and the Quantico Marine Barracks. Only 7,610 acres were dusted in 1944 as compared with 32,536 acres in the previous year. The control was effective. For all six military establishments the mean number of large larvae per 100 dips was 0·52 and the average number of adult female *A. quadrimaculatus* per resting station per observation was 0·6, a comparable figure to that of the previous year when much more extensive airplane dusting was done.

*Norman White.*

BRACKETT, S. & HUGHES, Carrie O. **Chilling as a means of retaining the Viability of the Sporozoites of** *Plasmodium gallinaceum.* *J. Parasitology.* 1945, Aug., v. 31, No. 4, 288–9.

In experiments in which chicks are infected by inoculation of sporozoites of *Plasmodium gallinaceum* it is important to get as much uniformity as possible in the infections produced. When chicks are exposed to the bites of infective *Aëdes aegypti* mosquitoes, only 85 per cent. of them become infected, and when COATNEY *et al.* [this *Bulletin,* 1945, v. 42, 865] inoculated infected salivary glands subcutaneously into 200 chicks, only 97·5 per cent. became infected. For many purposes, *e.g.* drug testing, there should be no uninfected birds. The injection of pooled sporozoite suspensions has always, in the authors' experience, and in that of others, produced infection.

It is also necessary to have uniformity in the character of the infections. When kept at room temperature the viability of the sporozoites decreases during the hour needed to inoculate intravenously 200 to 300 chickens, as is shown by the differences in parasitaemia on the eighth day of infection. The authors' colleague, Dr. WALETZ, suggested that the ground-up mosquito material should be chilled as soon as possible and kept in an ice-bath during the inoculations; this resulted in more uniform infections. The sparing effect of low temperature was also shown by the increased virulence of the chilled preparations as measured by the degree of parasitaemia produced; oöcyst counts showed that this could not be due to more intense infections in the mosquitoes. Even as short an exposure as 15 minutes to room temperature probably causes marked injury to sporozoites. *J. F. Corson.*

MARSHALL, P. B. **The Absorption of Sulphonamides in the Chick and the Canary, and its Relationship to Antimalarial Activity.** *J. Pharm. & Exper. Therap.* 1945, May, v. 84, No. 1, 1–11. [12 refs.]

A study was made of sulphanilamide and eleven derivatives to measure their rate of absorption from the gut and their concentrations in whole blood and in red cells of chicks and of canaries. The drugs are absorbed more quickly and excreted from the blood more quickly in canaries than in chicks. The concentration in the red cells is usually higher in the canary than in the chick. The drugs showed pronounced activity against *Plasmodium gallinaceum* in chicks, but they were mostly inactive against *P. cathemerium* in canaries. A blood concentration of 10 mgm. sulphadiazine per 100 cc. was very active against *P. gallinaceum*; to suppress infections of *P. cathemerium* blood concentrations of 60–100 mgm. per 100 cc. were needed. Generally speaking the degree of antimalarial activity of these compounds in chicks can be correlated with the height of the blood concentration curves. *F. Hawking.*

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## BLACKWATER FEVER.

JOURNE, H. Le rein dans la fièvre bilieuse hémoglobinurique. Etude clinique. Conceptions hystophysiologiques et indications thérapeutiques. [**The Kidney in Blackwater Fever.**] *Méd. Trop.* Marseilles. 1944, May–June–July–Aug., v. 4, No. 3, 225–35.

This is a review of the renal signs and symptoms, pathology and treatment of blackwater fever. The author considers that the theory of blockage of the renal tubules does not explain "the diversity of clinical and biological symptoms which accompany anuria and its development." He asks, for instance,

how the abrupt onset of anuria can be explained by obstruction of the tubules, unless there develops a sudden simultaneous complete obstruction. He considers the reversibility of the condition an argument against a purely mechanical explanation of the anuria. He points out that the urine often clears of haemoglobin before the onset of anuria, suggesting that most of the haemoglobin is already excreted, and that the urine passed in the early stages of recovery from anuria does not contain the cellular and blood débris which might be expected to appear as the result of sudden clearance of obstruction in all the uriniferous tubules. He rightly emphasizes the loss of concentrating power in the post-anuric phase, and suggests that in recovery there is a sudden restoration of (glomerular) filtration in the kidney, followed by a slower recovery of the damaged tubules. There is a brief second-hand account of the histological appearances of the kidneys, in which the similarity between the lesions of blackwater fever, crush injury and incompatible transfusion is noted.

No biochemical investigations of cases, other than estimations of urea N, have been carried out by the author, but he suggests on the analogy of "transfusion nephritis," that there is probably a reduction in plasma chloride and alkali reserve. On these grounds he recommends alkali administration.

The author's main conclusion in this discursive paper, is that the cause of anuria in blackwater fever is not yet decided and that precipitation of haemoglobin products may play a part but is not the whole explanation.

*B. G. Maegraith.*

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## TRYPANOSOMIASIS.

FIENNES, R. N. T.-W. **A Sexual Reproduction Cycle of** *Trypanosoma congolense* **Broden.** [Correspondence.] *Nature.* 1945, Sept. 29, 390–91.

The author describes what he saw through the microscope in fresh preparations of a mixture of a drop of mouse blood heavily infected with *Trypanosoma congolense* and a drop of 0·3 per cent. solution of sodium chloride; he states that the addition of the salt solution to the blood caused sexually mature trypanosomes quickly to become micro- and macro-gametes and conjugate within ten minutes.

The macrogametes were 13–19$\mu$ long, with somewhat anteriorly placed nucleus, both nucleus and cytoplasm being intensely granular except a posterior area which was clear, translucent and swollen. The microgamete, 6–9$\mu$ long, with posteriorly placed nucleus and the rest of the body an attenuated filament, entered, posterior end first, the translucent area of the macrogamete and was absorbed. "A motile zygote is formed, of trypanosome form, but tapering from the posterior end. Nuclear material is next concentrated centrally or posteriorly, and by contraction of other parts of the body an amorphous oocyst is formed. The oocyst nucleus may after sixty minutes have divided once. The zygote is about 20$\mu$ in length, and oocyst about half this size."

Oocysts were also seen in skin and lung tissue. "The oocyst appears to form sporoblasts, probably eight, which divide into innumerable sporozoites. The sporozoites break away from the oocyst body and swim actively away by a kind of rolling movement."

The author intends to publish a preliminary paper in which more details will be given, and a full report later. [The question of the occurrence of

syngamy among trypanosomes is discussed in Wenyon's "Protozoology," 1926, pp. 339, 340; at that date no reliable evidence of its occurrence had been offered.] *J. F. Corson.*

See also below, FULTON, J. D. & GOODWIN, T. W. **Studies on the Estimation and Precipitation of Stilbamidine.**

See also below, FULTON, J. D. & GOODWIN, T. W. **The Effect of Light on various Aromatic Diamidines in the Solid State.**

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## LEISHMANIASIS.

HORGAN, E. S. & SATTI, M. H. **Penicillin in Kala Azar.** [Correspondence.] *Nature.* 1945, Sept. 8, 297.

Two adult patients in the Sudan, with typical kala azar, were treated with penicillin, 20,000 units in 4 cc. normal saline intramuscularly at intervals of 3 hours to a total of 1,500,000 units. The result was complete failure; no beneficial effect could be seen, and the condition of one patient deteriorated. Gland and spleen smears remained positive.

The authors admit that kala azar in the Sudan is more resistant to treatment than kala azar in India, but their experience gave no indication that better results could be achieved by larger doses and continuous administration.

*Charles Wilcocks.*

FULTON, J. D. & GOODWIN, T. W. **Studies on the Estimation and Precipitation of Stilbamidine.** *J. Pharm. & Exper. Therap.* 1945, May, v. 84, No. 1, 34–41, 1 fig. [11 refs.]

A spectrographic method is described for estimating stilbamidine in biological fluids; for the technical details of this, the original paper must be consulted. About 2 cc. of serum is required, which was obtained by pooling the blood of several mice. The method measures down to 5 $\mu$gm. per cc. with an accuracy of $\pm$ 3 per cent.; at levels less than 2 $\mu$gm. per cc. measurements cannot be made. When the maximum tolerated dose of stilbamidine is given to mice orally, intravenously, intraperitoneally, or subcutaneously, the serum concentration reaches 40 $\mu$gm. per cc. within half an hour and then rapidly diminishes. Within 1–2 hours, only traces remain in the blood. Clearly the compound is rapidly absorbed and stored or excreted. When the minimum amounts required to cure infections of *Trypanosoma rhodesiense* are given to the mice, the serum contains only traces of the drug. Contrary to what had previously been reported, the authors found that absorption of stilbamidine by red blood corpuscles was non-existent or negligibly small. Stilbamidine is precipitated from the blood by many agents, including some, *e.g.* trichloracetic acid, metaphosphoric acid, which are used to remove proteins. It is also precipitated by sodium citrate. *F. Hawking.*

FULTON, J. D. & GOODWIN, T. W. **The Effect of Light on various Aromatic Diamidines in the Solid State.** *J. Pharm. & Exper. Therap.* 1945, May, v. 84, No. 1, 42–5.

When stilbamidine, 4 : 4′-diamidino tolane, and 4 : 4′-diamidino-$\alpha$-methylstilbene are exposed to sunlight in the dry solid state, they often become yellow. The authors found that in spite of this change there was no significant alteration in the absorption spectra, toxicity for mice, or therapeutic action (tested

against *Trypanosoma rhodesiense*). Accordingly it is considered that solid specimens of stilbamidine, etc., which have gone yellow after exposure to light in the tropics, can still safely be used for human treatment. When one of these yellow samples of stilbamidine is dissolved and then exposed to light, it undergoes the same increase in toxicity as unexposed solids do under the same conditions. *F. Hawking.*

BERBERIAN, D. A. **Cutaneous Leishmaniasis (Oriental Sore). VI. Treatment with Quinacrine Hydrochloride.** *Arch. Dermat. & Syph.* 1945, July, v. 52, No. 1, 26–7.

In 1938 it was reported by FLARER [this *Bulletin*, 1939, v. 36, 454] that he had obtained good results in the treatment of oriental sore by infiltrating the surrounding skin with solutions of quinacrine hydrochloride (atebrin). This method of treatment in the hands of other observers gave varying results, though generally it was admitted that early lesions responded well. The author of the present paper tested the treatment in six cases of oriental sore which he had produced on the legs of volunteers by the intracutaneous inoculation in each case of 0·2 cc. of a suspension of culture of *Leishmania tropica* containing approximately 200,000 organisms. All sores were 157 days old when treatment was commenced by injecting 1 to 2 cc. of 10 per cent. solution at weekly intervals. In no case did the treatment favourably affect the course of the disease. It was found, on the other hand, that intravenous injections of neostibosan hastened the healing of sores in the ulcerating stage. It was also observed that the subcutaneous injection at bi-weekly intervals of 0·1 to 0·5 cc. of a vaccine of killed culture forms of *Leishmania tropica* (3 to 5 million organisms per cc.) caused sores to ulcerate and thus favoured a rapid healing. [See also this *Bulletin*, 1944, v. 41, 470.] *C. M. Wenyon.*

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## FEVERS OF THE TYPHUS GROUP.

UNITED STATES PUB. HEALTH SERVICE. NATIONAL INST. OF HEALTH. BULLETIN No. 183. **Studies of Typhus Fever.** [TOPPING, N. H.; BENGTSON, I. A.; HENDERSON, R. G.; SHEPARD, C. C.; SHEAR, M. J.] pp. vi+110, 17 graphs. 1945. Washington, D.C.: Federal Security Agency, U.S. Pub. Health Service.

This little volume contains nine Reports dealing with part of the work carried out during the three years, 1942–44, at the Rickettsia Unit of the Division of Infectious Diseases of the National Institute of Health, U.S.A. Hitherto these papers have been distributed to only a small list of workers; the dates on which they would have been published in normal circumstances are shown in the following abstract; no changes have since been made in the texts. Some of the observations have already been incorporated in the present methods of vaccine production.

The volume, appropriately, is dedicated to the memory of one of the authors, Richard Gray HENDERSON, who died on October 20, 1944, of tsûtsugamushi disease (scrub typhus), contracted while he was investigating this infection.

*Studies of Typhus Fever Vaccines.*

(TOPPING, BENGTSON and SHEAR; March 27, 1942.)

(i) Topping and Bengtson found that the Cox type of vaccine then in use did not cause a great increase in the complement-fixation titres of guineapigs and that the immunity produced in the animals could be almost completely

broken down by challenge with virulent suspensions of rickettsiae. Other vaccines tested were Craigie's modification of the Cox vaccine, Castañeda's rat-lung endemic-typhus vaccine, and Giroud's mouse-lung epidemic-typhus vaccine. The percentage of guineapigs in which standard doses of each vaccine caused a rise in the complement-fixation titre to 1–64 were :—With the Giroud vaccine, 63 ; the Castañeda vaccine, 30 ; the Craigie vaccine, 26 ; and the Cox vaccine, 9·5. In the tests of vaccinated guineapigs challenged by very large, and equal, doses of rickettsiae the average number of days of fever resulting from the challenge were :—With the Giroud and Craigie vaccine, 0·4 each ; the Castañeda vaccine, 3·6 ; and the Cox vaccine, 4·5. In unprotected guineapigs the average was 9·0 days.

(ii) Topping and Bengtson carried out similar tests with the Cox-type vaccine, precipitated by alum. When this was given in a single dose of a four-times concentration, the complement-fixation titres were high and the challenged guineapigs had either no fever or only one day of fever. In human tests this vaccine, given in two doses produced a higher complement-fixation titre than the ordinary Cox vaccine.

(iii) Topping and Shear studied the antigens found in infected yolk sacs that had been treated with ether according to Craigie's method ; the supernatant fluid of centrifuged yolk-sac suspensions contained important antigens capable of causing positive complement-fixation reactions in guineapigs, strongly positive Weil-Felix responses in rabbits, and immunity in guineapigs. It was, therefore, thought desirable to include this " soluble antigen " in the preparation of vaccines [see also a paper by the same authors, in this *Bulletin*, 1945, v. 42, 457].

(iv) Bengtson found that under certain conditions the infecting agent in yolk-sac cultures passed through a Berkefeld N filter ; chick embryos inoculated with the filtrate survived 10–12 days and their yolk sacs usually contained larger numbers of rickettsiae than those inoculated with unfiltered suspensions. Other methods of increasing the yield of yolk sacs are discussed. There was a general degree of correlation between the number of rickettsiae in yolk sacs and the titre of the complement-fixation reaction in immunized animals, though great individual differences were observed.

A vaccine was prepared by ether treatment of homogenized yolk-sac suspensions without previous centrifugation, so that the soluble antigen was retained. After removal of the ether at 37°C., and slow centrifugation (1,000 r.p.m. for 10 minutes), the suspension was precipitated by alum.

*Epidemic Typhus ; Demonstration of a Substance Lethal for Mice in the Yolk Sacs of Eggs infected with R. prowazeki.*

(Bengtson, Topping and Henderson ; July 31, 1942.)

A toxic substance present in rich yolk-sac cultures of *R. prowazeki* killed mice within one to six hours, when injected intravenously in sufficient doses, which for different cultures " were 100 per cent. apart, diminishing from 0·5 cc. of a 5 per cent. suspension of yolk sac."

This toxin was destroyed by : (1) Heating for half an hour at 60°C. ; (2) formalin at a concentration of 0·375 per cent. ; (3) treatment with ether for 30 minutes. The substance appeared to be closely associated with the rickettsial bodies because it was absent from the supernatant fluid after high-speed centrifugation and from the filtrate after passage through a Berkefeld N filter. The toxin was neutralized by immune serum.

The number of minimum lethal doses in 1·0 gm. yolk sac was 40–320 in yolk sacs containing very numerous rickettsiae, and less than 40 in those containing few rickettsiae.

*Notes on the Preparation of Epidemic Typhus Vaccine.*

(TOPPING ; August 10, 1942.)

Details are given of a method of preparing the vaccine which was adopted after further study. In outline, the process was as follows :—A 30 per cent. suspension of yolk sacs was homogenized in saline containing 0·75 per cent. phenol and 0·3 per cent. formalin ; this was kept 24 hours in a cold room and then made into a 10 per cent. suspension by the addition of saline ; to it one-and-a-half volumes of ether were added, and it was shaken moderately for one or two minutes in a V-shaped funnel. After keeping for 24 hours in a cold room, the aqueous phase was drawn off and freed from ether *in vacuo*. Alum precipitation was still under trial, but was not recommended for general use.

*Notes on the Mouse Test with Typhus Vaccine.*

(TOPPING ; August 10, 1942.)

The power of sera of vaccinated guineapigs to neutralize the toxic substance contained in yolk-sac cultures was estimated. Full details are given of the technique.

*Epidemic Typhus Vaccine ; Preparation of Seed Virus for the Inoculation of Eggs, and of Lethal Material for the Neutralization Test in Mice.*

(BENGTSON ; February 19, 1943.)

The richest vaccines were obtained from yolk sacs in'ected with dilutions of 1–10,000 of yolk sacs very rich in rickettsiae. The best harvests were obtained from the sacs of chicks still surviving after 6–10 days. More uniform vaccines were obtained by pooling yolk sacs collected over a period of several days and keeping them frozen at a low temperature till used. The longest survival times of inoculated chick embryos, and often the richest vaccines, were obtained from yolk sacs inoculated with a 10 per cent. saline suspension of yolk sac which had been passed through a Berkefeld N filter ; sometimes, however, the filtrate was non-infective. For mouse-neutralization tests very rich yolk-sac suspensions in sterile milk were used.

*Epidemic Typhus Fever ; Neutralization of the Toxic Substance.*

(HENDERSON and TOPPING ; March 19, 1943.)

By an extensive series of experiments it was found that the mouse-neutralizing test served to measure the amount of neutralizing antibody contained in the sera of persons or animals after attacks of typhus fever and after vaccination against the disease. Very high titres were observed in convalescent patients, and substantial titres often persisted for several months after attacks. In vaccinated persons the titres were much lower and they declined more rapidly, yet they were considerably higher on the average than in vaccinated guineapigs.

The test was regarded as an important adjunct to other procedures for the investigation of typhus fever.

*Epidemic Typhus Fever ; a Study of the Antigenicity of Various Strains of Typhus Virus.*

(TOPPING, BENGTSON and HENDERSON ; September 24, 1943.)

Tests were carried out with Breinl, Colombian, and Spanish strains of epidemic typhus rickettsiae, and with the Wilmington strain of endemic rickettsiae.

No significant differences were found in the vaccines prepared from the various epidemic strains, but guineapigs vaccinated with the endemic strain had little, if any, protection against challenge with epidemic strains. Mouse-neutralizing tests gave similar results.

These experiments showed that sharp specific differences existed between the epidemic and endemic strains.

Sera of guineapigs inoculated with killed typhus antigens showed considerably higher titres of protection against homologous than against heterologous strains of antigen. The differences in the titres after experimental attacks were less pronounced.

*Epidemic Typhus Fever; Studies of Epidemic Typhus Vaccine.*

(TOPPING, HENDERSON and BENGTSON; February 18, 1944.)

In April 1942, 320 persons were immunized, some by two doses of 1·0 cc. of fluid vaccine, others by equivalent doses of alum-precipitated vaccine. Members of the latter group did not develop complement-fixation antibody as consistently, or in as high a titre, as those vaccinated with equivalent doses of fluid vaccine.

Neutralizing antibodies were developed rather uniformly after vaccination with either type of vaccine, and they persisted longer than the complement-fixing antigens.

A "booster" dose of vaccine, given some months after the primary vaccination, caused a much higher and more persistent rise in both types of antibody than the original vaccination; the neutralizing antibodies were produced more consistently, and persisted much longer, than the complement-fixing antibodies. The agglutination of *Proteus OX19* was not stimulated either by the primary or the "booster" vaccination.

*Technic of a Precipitin Test for the Study of Typhus Fever.*

(SHEPARD and TOPPING; May 19, 1944.)

Details are given of the methods of preparing a clear solution of antigen and a potent antiserum. Examples are given to show the applicability of the test to the measurement of antigen and antibody. The use of the test is not limited to intact organisms, as is the case with agglutination tests, nor to live organisms, as in the mouse-neutralizing test. Only two reagents with good keeping properties are needed. For details the original paper must be consulted.

*Typhus Fever; Antigens of the Rickettsiae of Typhus Fever, and the Changes Produced by Heat.*

(SHEPARD; June 9, 1944.)

Craigie *et al.* are quoted as having shown that when epidemic and murine rickettsiae are heated to 60°C. the type-specific, heat-labile antigens are destroyed, whereas the heat-stable antigen, common to both types, is not affected (CRAIGIE *et al.*, 1943, Memorandum No. 7, Project Med. 8, National Research Council of Canada).

In the present study Shepard used the precipitin, complement-fixation, and mouse-neutralizing tests. The sera of rabbits immunized by heated epidemic and murine rickettsiae did not give a positive precipitin reaction with unheated antigens, but they did react with heated antigens. Sera of rabbits and guineapigs immunized with heated antigen contained no neutralizing antibodies, and the guineapigs were still susceptible to challenge with virulent rickettsiae. It appeared, therefore, that the heat-stable antigens

were not concerned in the production of immunity: they were also found to have little epidemic or endemic type-specificity, and to have a broadened range of reaction with the precipitin test, so that, for example, they gave positive reactions with sera of animals immunized against *Proteus OX19*.

From these and other observations recorded in the paper the author concludes that the cross immunity between epidemic and murine typhus is not due to the absence of specificity in the heat-stable antigens, but to "a similarity of the unheated antigens." *John W. D. Megaw.*

GREIFF, D. & PINKERTON, H. **Effect of Enzyme Inhibitors and Activators on the Multiplication of Typhus Rickettsiae. II. Temperature, Potassium Cyanide, and Toluidin Blue.** *J. Exper. Med.* 1945, Sept. 1, v. 82, No. 3, 193–206. [16 refs.]

The present study is in continuation of work already done by the authors, in which they showed that penicillin and para-aminobenzoic acid (PABA) inhibited the growth of typhus rickettsiae in the yolk sac. [See this *Bulletin*, 1945, v. 42, 362.]

In the present experiments murine rickettsiae of the 45th passage were used. The authors found that the following factors affected the growth and multiplication of rickettsiae in the endodermal cells of the yolk sacs of hens' eggs:—

(1) Reduction of the time of "blending" of the infecting suspensions from four minutes to ten seconds caused a considerable average increase in the multiplication of the rickettsiae. (2) Eggs of Wyandotte hens yielded scanty cultures as compared with eggs of White Rock hens in which growth was abundant. It was thus possible to obtain cultures of varying richness for different types of experiment. (3) Growth was much more active in eggs incubated at 37·5°C. than in those incubated at 40°C. (4) Suitable doses of potassium cyanide solution introduced into the yolk sacs greatly stimulated the growth of rickettsiae; presumably by depressing the metabolic activity of the cells. (5) Toluidin blue delayed the development of rickettsiae by about three days, but the inhibiting action wore off as the dye became decolorized, and repeated injections were impracticable. (6) The inhibiting action of a temperature of 40°C. was neutralized by potassium cyanide, but the similar action of toluidin blue was not affected, so that the mechanism of inhibition must have been different. (7) The inhibiting action of PABA was not neutralized by potassium cyanide.

Several compounds related to PABA were tested but no inhibiting action was detected. *John W. D. Megaw.*

GRENOILLEAU, G. L'épidémie de typhus en Algérie (1941–1942–1943). [**The Epidemic of Typhus Fever in Algeria (1941, 1942, and 1943).**] *Arch. Inst. Pasteur d'Algérie.* 1944, Dec., v. 22, No. 4, 353–79, 4 graphs.

The incidence of louse-borne typhus in Algeria during each of the four successive seasons, October to the following September, was as follows:— 1939–40, 11,874; 1940–41, 55,530; 1941–42, 193,352; and 1942–43, 45,408. The seasonal incidence was of the usual type; for example there were 306 cases in October 1941, and a steady rise reaching the peak figure of 6,106 cases in March 1942; high but gradually declining figures were recorded in April, May, and June; in July a rapid fall set in, and in September the figure was 352. The author believes that all the official figures ought to be multiplied by five or six to give a true estimate of the number of cases that actually occurred.

Considerable importance is attached to the carry-over of infection by the dried faeces of infected lice, and possibly of fleas, though mild and inapparent attacks in children are also important. The fatality rate among the indigenous population was 22 per cent. ; among Europeans it was 30·7 per cent., ranging from 5 per cent. in children of 10 years and under to 100 per cent. in persons over 70.

More than 3½ million doses of Blanc's live murine vaccine were administered between December 1941 and January 1944. The Durand-and-Giroud killed vaccine was administered to 297,000 persons. Examples are given of the striking success that resulted in several localities from the use of the Blanc vaccine, which, however, had the drawbacks of causing attacks of murine typhus in 5–6 *per mille* of the persons vaccinated and of being somewhat unreliable at times. There never was the slightest reason to suspect that murine infection was introduced into any locality as a result of the use of the vaccine. The killed vaccine of Durand and Giroud had been given to 13 medical men who subsequently contracted the disease, but none of them died. There were 14 deaths among 19 non-vaccinated medical men, so that the life-saving effect of the vaccine was clearly demonstrated. It is also stated that no death was known to have occurred among the 297,000 persons protected by this vaccine, which was also completely safe. The chief drawbacks of the killed vaccine were the necessity for giving two or three doses and the short duration of the resulting immunity, which was estimated to be six months, against about three years in the case of the live vaccine.

Laigret is said to have already developed a murine live vaccine prepared from the brain of the white mouse and applied by scarification of the skin.

The Pasteur Institute of Algeria is producing a killed vaccine for use in a single dose of 2 cc. and specially intended for communities which are already partly immune to the disease.

In a footnote it is claimed that the measures adopted have brought the epidemic under control in conditions in which it would have been expected to persist ; during the first six months of 1944, only 874 cases were reported. The chief credit is given to vaccines ; disinfestation and disinfection on the necessary scale were found to be impracticable in the conditions that existed during the epidemic. A supply of DDT obtained from the Rockefeller Foundation was strikingly successful in the localities in which it could be employed.

*John W. D. Megaw.*

Macchiavello, A. & Cifuentes, O. Significación epidemiológica de los caracteres clínicos del tifo exantemático al final de una epidemia. [**The Epidemiological Significance of the Clinical Features of Exanthematic Typhus Fever at the End of an Epidemic.**] *Rev. Chilena de Hig. y Med. Preventiva.* 1945, Mar., v. 7, No. 1, 15–33. English summary.

The authors present a critical statistical analysis of the chief clinical features of 225 cases of louse-borne typhus observed between May 28th and September 2nd, 1939. During this period the 1937–39 epidemic in Santiago was coming to an end and the authors conclude that at such a time the number of mild and atypical attacks tends to increase, so that cases are likely to be missed unless this matter is borne in mind.

Although the fatality rate of 24 per cent. does not suggest that the disease was of a specially mild type, a number of interesting points are brought out in the tables and in the text.

After a primary defervescence and " clinical cure," 69 of the patients had a recurrence of the fever lasting one to three days but without special symptoms, and the temperature seldom rose as high as 39°C. In some severe cases the

temperature fell to normal before the signs and symptoms had completed their evolution. The termination was by crisis in 51 cases and by lysis in 75 ; in the others the secondary rise of temperature occurred or the termination could not be observed.

Among 182 cases the duration of the fever was 3–6 days in 3 ; 7–8 days in 9 ; 9–12 days in 73 ; 13–16 days in 80 ; and 17–24 days in 17.

The Weil-Felix titre rose to 1–160 or over in 214 of the 225 cases. Relatively low titres of 1–160 and 1–320 occurred in 75 patients, of whom 14 died ; in the remaining 139 patients the titres were 1–600 or 1–1,000 and among these there were only eight deaths.

Complications involving the lungs occurred in 74 cases ; pneumonia occurred in 12 cases, severe bronchitis in 7, bronchopneumonia in 4, pleurisy and acute laryngitis in 2 each. There was only one case of suppurative otitis ; parotitis, thrombosis, or haemorrhage, are not mentioned in the text or shown in the table. *John W. D. Megaw.*

FALIN, L. I. [**Changes in the Nervous Elements of the Skin and some other Organs in Typhus Fever.**] *Byull. Eksper. Biol. i Med.* Moscow. 1945, v. 19, No. 3, 33–7, 3 figs. [In Russian.]

With a view to throwing light on the mechanism of the vasomotor, secretory and trophic disturbances in typhus fever, the author has studied the changes undergone by the terminal portions of the peripheral nervous system. Special attention was devoted to the histopathology of the nerve fibres and endings in the skin, since—like the central nervous system—this is one of the chief regions where the characteristic vascular changes occur. For comparison, a study was also made of the corresponding nervous elements in the epiglottis.

As the result of this investigation the author arrives at the following conclusions : (1) In typhus fever the elements of the peripheral nervous system of the skin and epiglottis are markedly but irregularly affected. (2) The changes undergone by the nerve fibres are usually degenerative, but in some cases they are due to irritation. (3) The sensory nerve endings in the skin, of the type of Meissner's and genital corpuscles [the end-bulbs of Krause in the glans penis], usually retain their normal structure, but some exhibit phenomena of irritation in the form of globular thickenings (*Kugelphänomen*) at the end of the terminal filaments. (4) In view of the relatively good preservation of the sensory nerve endings and of the thick myelinated fibres in the skin and in the epiglottis, it would appear that the majority of degenerated nerve fibres observed in the nerve plexuses belong to the vegetative, and in particular to the sympathetic system proper. *C. A. Hoare.*

YEOMANS, A., SNYDER, J. C. & GILLIAM, A. G. **The Effects of Concentrated Hyperimmune Rabbit Serum in Louse Borne Typhus.** *J. Amer. Med. Ass.* 1945, Sept. 1, v. 129, No. 1, 19–24. [Refs. in footnotes.]

Concentrated hyperimmune rabbit serum, prepared by the Lederle Laboratories was administered to 25 patients, who had not been vaccinated against typhus, at the Cairo Fever Hospital in a ward placed at the disposal of the U.S.A. Typhus Commission. The patients were Egyptians aged 18–48 years in whom the time of onset of the fever was clearly less than seven days. For reasons " not pertinent to this discussion " the system of alternate controls was not adopted, but 44 other cases comparable in all respects, except as to the dates of onset, served as controls.

Each patient was tested for sensitiveness to rabbit serum, by intradermal injection of 0·1 cc. of a normal animal s serum ; the response was observed

after 20 minutes. The specific serum was injected daily, intravenously, intramuscularly, or usually by both routes. The initial dose was 1·0 cc. for each pound of body weight ; the later doses were 0·25 cc. for each pound of weight. Intravenous injections were given at a rate of not more than 0·5 cc. per minute for the first 5 cc., and afterwards a rate of 4 cc. was never exceeded. Chills occurred in seven cases, probably because of imperfectly prepared glassware. Vomiting occurred in one, with a fall of 24 mm. in the systolic blood pressure ; nausea occurred in two with a fall of 16 mm. in the systolic pressure. Headache was caused or increased in 11 cases. Intramuscular injections of serum, up to a maximum of 115 cc. in 24 hours, were made into the buttocks. The average quantity of serum given to each patient was 186 cc., the range was 51 to 512 cc. The duration of the treatment varied from one to six days.

No death occurred among the 25 treated patients ; there were eight deaths among the 44 controls. The average duration of the fever in the treated subjects was 13 days, in the controls it was 18½ days. The most convincing evidence of the efficacy of the treatment was the remarkable mildness of the attacks in the 10 patients whose treatment was started on the second or third day ; in seven of these the attacks were exceptionally mild, in two it was moderately severe, and in one it was severe. The fever lasted for only seven or eight days in four of these patients, it lasted for 10–14 days in five, and for 17 days in one. A comprehensive analysis of the chief features of the cases is presented in tabular form. Seven of the patients had serum sickness. Rickettsiae of the epidemic type were isolated from 18 of the 25 patients.

It was concluded that the serum had a favourable therapeutic effect when the treatment was started within the first three days of the illness, when started later its value could not be determined with certainty. From the data available it appeared that para-aminobenzoic acid had a more definitely favourable effect on patients who came under treatment after the third day [see this *Bulletin*, 1945, v. 42, 201].

The serum is available in very limited quantities and presumably it is very costly, so that its use is likely to be restricted to medical or sanitary personnel over the age of 40, and it would be specially needed by patients who had not been vaccinated or who had been incompletely vaccinated.

*John W. D. Megaw.*

ALLEN, A. C. & SPITZ, Sophie. **A Comparative Study of the Pathology of Scrub Typhus (Tsutsugamushi Disease) and other Rickettsial Diseases.** *Amer. J. Path.* 1945, July, v. 21, No. 4, 603–81, 86 figs. (14 coloured) on 18 pls. [57 refs.]

This study was carried out at the Army Institute of Pathology, Washington. The tissues investigated came from 74 cases of scrub typhus in the New Guinea area, from 24 cases of epidemic typhus in Egypt, and from 12 cases of Rocky Mountain spotted fever. The paper is illustrated by 86 excellent photomicrographs, of which 14 are coloured : it deals almost entirely with the morbid histology of the diseases, and one special object of the study was to determine whether any of the changes observed in mite-borne typhus " were sufficiently characteristic and constant as to permit a histological differentiation of the various typhus fevers."

The study is of special value because of the wealth of material that was available and because this material was thoroughly investigated by a single team of highly skilled observers. [The findings, however, cannot be regarded as universally applicable in all respects to each of the three typhus fevers. All of these are known to show a wide range of variability in their clinical aspects so that although the morbid histology of each may conform to a single

general pattern, considerable variations in the details of the pattern can be expected to occur in different outbreaks of the disease. The descriptions of the morbid histology of louse-borne and mite-borne typhus by various competent observers provide clear evidence that these variations do occur. This comment does not detract from the great intrinsic value of the paper.]

In the detailed description of the eschar of scrub typhus the important part played by secondary, chiefly staphylococcal, infection is clearly shown. The lesion begins as a vesicle which soon becomes a pustule associated with a strictly local thrombophlebitis and arteritis of a septic type; the rickettsial reaction is seen in the veins at some distance from the central area. It takes the form of a mononuclear infiltration of the vessel walls; sometimes there is also swelling of the endothelial cells, and occasionally non-occlusive thrombus is seen.

In the skin macules the equivalent of the "typhus nodule" is seen in the arterioles, capillaries, and veins; the changes observed in these vessels "appeared to constitute an expression of intrinsic vascular, usually intimal damage."

The macules of louse-borne typhus are essentially similar, but the capillary thrombi, though less constantly present, are more conspicuous when they do occur, and the endothelial cells are more obviously damaged: there is also a tendency to a necrotizing arteritis which is not found in scrub typhus. The macules of Rocky Mountain spotted fever, and also of boutonneuse fever, resemble those of louse-borne rather than of mite-borne typhus.

The vascular changes found in other parts of the body are of the same general type and the conclusion is reached that "arteritis is exceedingly slight in scrub typhus in contrast with epidemic typhus and Rocky Mountain spotted fever."

The percentage incidence of some of the chief findings is shown in the following table which has been compiled from the tables and other information contained in the paper:—

| | Scrub Typhus | Epidemic Typhus | Rocky Mountain Fever | Remarks |
|---|---|---|---|---|
| Interstitial myocarditis ... ... | 93 | 83 | 83 | In all three groups there was a remarkable degree of preservation of the myocardial fibres. |
| High-grade interstitial myocarditis | 49 | 33 | 25 | |
| Interstitial pneumonitis ... ... | 55 | 35 | 9 | |
| Bacterial bronchopneumonia ... | 30 | 78 | 20 | |
| Hyperplasia of lymph nodes ... | 100 | Usual | Usual | Most pronounced in scrub typhus. |
| Necrotic areas in lymph nodes ... | 38 | 0 | 0 | |
| Diffuse glomerulonephritis ... | 30 | 78 | 50 | |
| Typhus nodules in pons cerebri ... | 33 | 81 | ? | |
| Typhus nodules in grey cortex ... | 10 | 83 | Nil | |

The nodules of scrub typhus are similar in type to those of epidemic typhus; the corresponding lesions in Rocky Mountain fever are "microinfarcts" distributed in the white matter of the cortex which was never invaded by the nodules of the other two diseases.

The histological changes observed in the liver, spleen, pancreas, adrenals and gastrointestinal tract were essentially similar in all the three groups of typhus fevers. The authors do not accept the view that the vascular atony and increased permeability observed in epidemic typhus are due to structural damage to the vessels caused directly by the presence of the rickettsiae; it is pointed out that vasomotor collapse is just as striking a feature of scrub typhus as it is of epidemic typhus so that the histological findings do not support the "mechanistic" view. A humoral mechanism is regarded as a more likely explanation, and evidence was found of damage to the cortical cells of the adrenals so that the question of adrenal insufficiency deserves consideration. Reasons are given for regarding the effects of the rickettsiae as being largely due to allergic action, and reference is made to the basic clinical, aetiological, and, in many respects, immunological similarities between scrub typhus and the other rickettsial diseases. The authors classify the human rickettsioses in four groups:—

I. The Typhus Group (louse-borne and flea-borne) with *Proteus OX19* Weil-Felix reaction.

II. Spotted Fever Group (tick-borne) with indeterminate Weil-Felix reaction.

III. Tsutsugamushi fever group (larval mite-borne) with *OXK* response.

IV. Miscellaneous Group, all with negative Weil-Felix reactions. In this group are included Q fever, believed to be tick-borne, trench fever which is louse-borne, and the two problem fevers of North America, Colorado and Texas tick fevers, of which it is stated that "proof of the rickettsial aetiology of these diseases is not yet universally accepted." *John W. D. Megaw.*

Settle, E. B., Pinkerton, H. & Corbett, A. J. **A Pathologic Study of Tsutsugamushi Disease (Scrub Typhus) with Notes on Clinicopathologic Correlation.** *J. Lab. & Clin. Med.* 1945, Aug., v. 30, No. 8, 639–61, 15 figs. [23 refs.]

The lesions occurring in tsutsugamushi disease in man and experimental animals are described in detail; the paper is illustrated by 15 clear reproductions of good photomicrographs.

The authors classify the human rickettsial diseases, excluding "the moot problem of trench fever," into (1) typhus, human (carried by lice), and murine (carried by fleas), (2) spotted fever (carried by ticks), (3) tsutsugamushi fever (carried by mites), and (4) Q fever (infection found in ticks but epidemiological studies are incomplete). This classification is said to be definitive on immunological grounds. [The name spotted fever when divorced from the qualifying words, Rocky Mountain, is certainly not definitive.]

The present study is based on 55 fatal cases among American troops stationed in and near New Guinea. Special attention has been given to a comparison of the pathology of tsutsugamushi fever with that of typhus and "spotted fever": it is stated that in all these diseases the pathological changes are direct results of the multiplication of rickettsiae in the endothelial cells or smooth muscle cells of the blood vessels, and that the organisms cause swelling and proliferation of the endothelium, cellular infiltration of the vessel walls, perivascular accumulation of mononuclear cells, and occasionally thrombosis and haemorrhage. Epidemic typhus and "spotted fever" are said to have remarkably similar histopathological features, except that the tendency to

haemorrhage and thrombosis is greater in the latter disease. In tsutsugamushi disease this tendency is even less than in typhus. The chief special features of tsutsugamushi fever are : the frequent occurrence of a local ulcer, and the very pronounced degree of involvement of the serous membranes, the myocardium, the lungs, and the lymph nodes. The cerebral lesions in all three diseases are said to be " similar in all essential features."

In discussing the causes of death the authors make the following statements :—Generalized vasculitis was a constant finding ; this was regarded as causing peripheral circulatory collapse like that occurring in surgical shock. Myocarditis was of invariable occurrence, and in about half of the cases it caused myocardial necrosis of varying degree so that it may have caused death from heart failure. Sulphonamides have been reported as causing myocarditis in sensitive individuals and as these drugs had been given to some of the patients they may have contributed to the myocardial damage. Rickettsial encephalitis was probably the most important cause of death in about one-third of the cases. The influence of renal lesions could not be accurately evaluated. Interstitial pneumonitis, regarded as rickettsial, was of almost constant occurrence ; it probably paved the way for bacterial pneumonia. Secondary bronchopneumonia accounted for death in about 20 per cent. of the cases. The part played by circulating rickettsial toxins needs further study.

In 13 out of 14 cases, rickettsiae were isolated by intraperitoneal injections into white mice, of heart blood of patients who had died between the 7th and 20th days of the illness. The pathological findings in inoculated mice and guineapigs are described. White rats and locally caught bandicoots were not found susceptible to intraperitoneal inoculation.

The rickettsiae are stated to be morphologically similar to those of typhus and " spotted fever," " with minor differences, which are perhaps not constant."

[It is impossible in a brief abstract to give an adequate summary of the detailed descriptions here given of the pathological anatomy and histology of tsutsugamushi disease. These, with the excellent illustrations, form an important contribution to the literature of the subject ; they also serve to correct the impression conveyed by some other workers that the tissue changes occurring in the disease are essentially different from those found in the other fevers of the typhus group.] *John W. D. Megaw.*

TATTERSALL, R. N. **Tsutsugamushi Fever on the India-Burma Border.** *Lancet.* 1945, Sept. 29, 392–4, 2 figs.

This is a succinct account of certain clinical aspects of mite-borne typhus fever, of which 500 cases were seen during the year 1943 and the early part of 1944 ; the analysis of the mortality rates and complications is based on these cases and on 500 others seen during the later part of 1944 and January 1945.

In one battalion of British troops engaged in exercises at the foot of scrub-covered hills, 121 soldiers were attacked between October 21st and November 19th, 1943 ; the first case occurred 9 days after the arrival of the troops in the area, and the last 17 days after their departure, so that the known range of the incubation period was 9–17 days.

Some of the chief findings were as follows ; the figures in brackets are percentages. The onset was sudden in most cases. The primary ulcer (11) when present, was associated with regional lymphadenitis. The rash in Europeans (64) and Indians (31) was macular or papular ; occasionally it was purpuric. Discrete, generalized, and tender, enlargement of the lymph glands (92) usually

appeared about the third day and disappeared about the fifteenth day. Splenomegaly (47) occurred during the third and fourth weeks. Deafness (35) usually improved during convalescence. The cough (100) was usually accompanied by physical signs (68) which commonly were those of patchy basal consolidation. Mental changes (100) ranged from slight blunting of the intellect to coma or mania. Flushing with cyanosis in European patients (100) usually appeared by the fourth day and disappeared at the height of the illness, in the third week, when signs of cardiac inefficiency set in. The headache (100) was frontal and retro-orbital with photophobia.

A secondary fever (15), lasting three to five days, sometimes followed a short remission, but was not accompanied by special symptoms. The fatality rate (6) was 7½ per cent. in Europeans, and 5 per cent. in Indians. The average duration of the fever was 18 days.

The *Proteus OXK* titre rose to 1–200 or over in all the 500 cases in which the test was carried out; these titres were reached in 80 per cent. of the tests carried out between the 11th and 13th day.

The leucocyte count was substantially normal, and was not helpful in diagnosis. Lobar pneumonia, pleural effusion, lung abscess, or empyema, occurred in 10 per cent. of the cases. Haemorrhages (9) were, subconjunctival, epistaxis, haemoptysis, haematemesis, or rectal. Venous thrombosis and symmetrical gangrene occurred in two cases each. The nervous sequelae (2) included seven cases of retrobulbar neuritis and twelve of fleeting painful paralysis of various muscles of the shoulder girdle.

Muscular pains, chiefly in the legs, were usual during convalescence; tachycardia was common at this stage, but seldom persisted, though some patients after return to duty were placed in a low category of fitness on the grounds of "effort syndrome". A cardiac neurosis was often caused by the solicitous attention paid by some medical officers to the cardiac condition. A long convalescence was always needed.

The patients bore a journey badly after the fifth day; transfers between the seventh and twentieth days were considered very dangerous.

Lumbar puncture was found useful in relieving headache. Sulphonamides and penicillin were useful only for bacterial lung complications of which leucocytosis was a valuable indication; they were contra-indicated in rickettsial pneumonia. Convalescent serum, given in small doses in a few cases, caused no clinical improvement. *John W. D. Megaw.*

SANGSTER, C. B. & KAY, H. B. **Scrub Typhus: Clinical Aspects.** *Med. J. Australia.* 1945, Aug. 4, v. 2, No. 5, 138–45, 1 fig.

The authors studied 235 cases of scrub typhus in an Australian general hospital in New Guinea during the months October 1943 to May 1944.

Among the 125 patients admitted during the last three months of 1943 there were only four deaths, whereas among the 110 admitted in 1944 there were 16 deaths. The clinical picture was confused by the coexistence of malaria; parasites were found in 51 per cent. of the patients although all of them had been taking "suppressive atebrin" up to the onset of their attacks. Bacillary dysentery, ankylostomiasis and epidemic hepatitis were also complicating factors in some cases.

An eschar was seen in 41 per cent. of the cases; a rash occurred in 52 per cent. The onset was rapid; the temperature fluctuated between 102° and 104°F.; the termination was by lysis. Occasionally the temperature was of the "hectic" type. Except in a few patients, who had mild and almost symptomless attacks, prostration was pronounced from the onset. Drenching sweats occurred in some cases. There was evidence of cardiac dilatation,

accompanied by a fall in the blood pressure, on about the 12th to the 14th day of severe attacks. Cyanosis was frequently seen, but anasarca and other indications of congestive heart failure never occurred. The electrocardiographic findings were such as would be expected in any severe general infection.

Cough was a frequent early symptom, the sputum was thin and mucoid except in a few cases in which it was purulent as a result of secondary infection. Diarrhoea occurred during the toxic phase in 60 per cent. of the cases; it was seldom due to dysenteric infection. The spleen was palpable in 25 per cent. of the patients. Albuminuria was almost the rule in severe attacks but only one patient had typical glomerulonephritis.

A fatal issue was ushered in by great fluctuations of temperature, collapse, sweating, increasing cyanosis, and a rapid thready pulse. Just before death the temperature often rose to 105° or 106°F.

In treatment, complete rest was maintained for about six weeks from the onset; then a cautious return to mild exercise was permitted, and after a further period of three weeks the patient was sent to a convalescent depot where he remained for two or three months. In most cases complete recovery could be expected.

An adequate fluid intake, of six to seven pints daily was provided without resort to intravenous administration. Calcium therapy appeared to be of some value; in 20 severe cases a 10 per cent. solution of calcium gluconate was given, intravenously or intramuscularly, in doses of 10 cc. once daily for six to fourteen days: the chief result was a rise in the blood pressure. Transfusion of blood or concentrated serum was tried in selected cases, but even with very slow transfusion the circulatory system could not deal with any large amount of fluid. Sedation was necessary in cases with intense toxaemia; sodium phenobarbital, bromide, chloral and morphine were used. Continuous oxygen administration was helpful.

There was no evidence that the tissue changes occurring in the disease were followed by fibrosis. *John W. D. Megaw.*

McGovern, V. **Pathological Aspects of Scrub Typhus in New Guinea.** *Med. J. Australia.* 1945, Aug. 4, v. 2, No. 5, 146–9.

This paper deals with the pathological findings in 134 of the cases discussed in the preceding article. No characteristic blood picture was found in the early stages; lymphocytosis and lymphopenia occurred with equal frequency (19 and 19·1 per cent. respectively). Among 15 fatal cases there was lymphocytosis in one and lymphopenia in six.

In three cases *Proteus OXK* was not agglutinated at any stage of the illness and in some other cases fleeting positive reactions at relatively low titres were observed. *Proteus OXK* was "occasionally" recovered from the urine or stool. In one case of dengue this organism was isolated from the stool three weeks after the attack, it was agglutinated by the patient's serum at a titre of 1–800.

Blood-serum proteins and calcium were usually low in comparison with the findings in patients who had malaria, dengue and epidemic hepatitis. [These findings do not agree with those reported by Gottfried (this *Bulletin*, 1945, v. 42, 885), but a pronounced fall in the calcium content of the blood has been reported in louse-borne typhus by German observers.]

Autopsies were performed in 14 cases. Generalized oedema of varying degree, and haemorrhages into some of the body tissues, were often seen. The usual macroscopic findings were: Pericardial and pleural effusions, dilatation of the right side of the heart, subpleural ecchymoses and haemorrhagic infarct-like areas on the surface of the lungs, oedema of the lungs, pneumonitis

or lobar pneumonia, enlargement and congestion of the spleen, and distension of the large gut. The liver, kidneys, and brain seldom showed obvious changes.

The microscopic changes most frequently seen were: Myocarditis, pneumonitis or pneumonia, and meningoencephalitis; all these appeared to be secondary to vasculitis. Frequently there was a significant degree of mononuclear infiltration of the intima of the larger vessels such as the coronaries: "the media was usually normal, but in the adventitia perivascular collections of round cells affecting the *vasa vasorum* were often present."

*John W. D. Megaw.*

TOPPING, N. H. **Cross Immunity between Four Strains of Tsutsugamushi Disease (Scrub Typhus).** *Pub. Health Rep.* Wash. 1945, Aug. 17, v. 60, No. 33, 945–7, 4 figs.

The four strains of *Rickettsia orientalis* used in making the cross-immunity tests in guineapigs consisted of two from New Guinea and one each from Malaya and the Assam-Burma border. Considerable differences were found in the virulence of the strains to guineapigs; the Malayan strain was the most virulent and one of the New Guinea strains was the least virulent. Clear cross immunity was found to exist between all the four strains, but the author considers that this does not "necessarily mean that the four strains are immunologically identical"; he points out that epidemic and murine typhus are distinct diseases, yet each immunizes against the other.

*John W. D. Megaw.*

JELLISON, W. L. **The Geographical Distribution of Rocky Mountain Spotted Fever and Nuttall's Cottontail in the Western United States.** *Pub. Health Rep.* Wash. 1945, Aug. 17, v. 60, No. 33, 958–61, 1 fig.

The author has found that the distribution of one species of cottontail rabbit, *Sylvilagus nuttallii*, corresponds very closely with that of "spotted fever" [tick-borne typhus] in the western U.S.A. Among the 7,546 cases of Rocky Mountain spotted fever recorded at the Rocky Mountain Laboratory up to 1942, 99·58 per cent. occurred in the 290 counties of the western U.S.A. within the range of this rabbit; only 0·42 per cent. occurred in the 229 western counties outside this range. The few cases of the disease reported from Canada, with one possible exception, came from places within the known range of the rabbit.

Other species of rabbit belonging to the genus *Sylvilagus* occur in Brazil, Colombia, and Sinaloa (Mexico), where a disease presumably identical with Rocky Mountain fever occurs.

*S. nuttallii* is an important host of all stages of *Dermacentor andersoni*, and it has been found susceptible to Rocky Mountain spotted fever; it occurs in great numbers and in all respects appears to be a suitable mammalian host of the disease. The author calls renewed attention to the remarkable fact that spotted-fever rickettsia have never been recovered from any mammal in nature in the western United States.

Each of the other three species of *Dermacentor* known to infest small mammals has a distribution which almost completely coincides with the distribution of one species of rabbit.

*John W. D. Megaw.*

MORRISSEY, G. C. & DERRICK, E. H. **A Case of Q Fever in North Queensland.** *Med. J. Australia.* 1945, Aug. 18, v. 2, No. 7, 214–15, 1 fig.

Between September 1935 and August 1944, 216 cases of Q fever were diagnosed in south-east Queensland; one other case may have originated either in North or South Queensland.

The present patient was employed at a water-works in Ingham, North Queensland; in the course of his work he walked through drains and undergrowth near the river bank. There was no history of a bite by a tick or other arthropod.

For the first 12 days of the illness there was relatively high fever of a deeply remittent type with heavy daily sweats; for the following 19 days there was a daily rise of temperature, but to a lower level. The onset was with cough and blood-stained sputum, so that a diagnosis of pneumonia was made. During the second week oedema of the ankles and ascites appeared, and the sweats ceased. In the third week signs of heart failure and jaundice occurred. The fever declined gradually and all the symptoms disappeared, with the exception of deafness which had set in at an early stage.

The serum-agglutinating titres for *Rickettsia burneti* were, 1–30 on the 26th day, and 1–1,000 on the 55th day; for *Proteus OXK* they were, 1–80 on the 26th day, and nil on the 55th day.

This was the first case confirmed as occurring in North Queensland; it narrows the gap between the endemic centres of Q fever in Queensland and Montana, U.S.A. by a mere 500 miles.

Bandicoots and cattle were numerous in the locality, and the bandicoot-tick, *Haemaphysalis humerosa*, has been reported by HEASLIP as occurring in North Queensland. *John W. D. Megaw.*

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## YELLOW FEVER.

BATES, M. & ROCA-GARCIA, M. **Laboratory Studies of the Saimiri-Haemagogus Cycle of Jungle Yellow Fever.** *Amer. J. Trop. Med.* 1945, May, v. 25, No. 3, 203–16, 2 figs. [24 refs.]

The authors have maintained a Colombian strain of yellow fever virus through five cycles in the laboratory, using Saimiri monkeys as hosts, and the mosquito *Haemagogus capricorni* as the vector. Details are given of the methods employed in keeping the mosquitoes in the laboratory. Wild-caught *Haemagogus* were used in all the experiments for there has been no indication of the presence of yellow fever virus in the study areas since 1940. Similarly, wild-caught Saimiri monkeys were used, but only animals whose sera was previously found negative in the yellow fever protection test.

The yellow fever virus used in the transmission experiments had been recently isolated from a patient (Perez) who died of the disease contracted in the Restrepo area north of Villavicencio.

This strain produced variable results when inoculated intracerebrally into adult white mice, but 3- and 5-day-old mice were highly susceptible. It was highly virulent for Saimiri monkeys and 8 out of 10 animals infected by mosquito bite died of acute yellow fever.

The extrinsic incubation period in *Haemagogus capricorni* was found to be 22 to 24 days at 24° to 27°C., and 13 to 15 days at 30°C. Only a certain percentage of the mosquitoes became infected after feeding on monkeys containing virus in the blood. The percentage infected seems to depend on the amount of virus ingested and the temperature at which the mosquitoes are kept.

The authors discuss the correlation between factors influencing the *Haemagogus* infection in the laboratory and the natural habits of the mosquito. The relatively high temperature necessary for infection is obtained by the species frequenting sunny localities in the forest canopy where the temperatures are higher than in the lower forest strata. Moreover, the habits of the Saimiri monkeys in the Villavicencio area closely correspond with those of *Haemagogus*.

In view of the fact that Saimiris are the commonest local primates and *Haemagogus* the most abundant Aëdine mosquito, one might have expected a higher incidence of yellow fever infection among them, but possibly the high mortality rate may account for the relatively low rate of positive protection tests (10 out of 81), most animals not surviving the infection. *E. Hindle.*

WADDELL, Mary B. & TAYLOR, R. M. **Studies on Cyclic Passage of Yellow Fever Virus in South American Mammals and Mosquitoes. Marmosets** (*Callithrix aurita*) **and Cebus Monkeys** (*Cebus versutus*) **in combination with** *Aëdes aegypti* **and** *Haemagogus equinus*. *Amer. J. Trop. Med.* 1945, May, v. 25, No. 3, 225–30, 3 figs. [14 refs.]

An investigation of the cyclic transmission of yellow fever by means of alternate passage through insect vector and vertebrate host with the object of helping to determine the way in which virus is maintained in certain forested regions of South America.

Three virus strains were used, two Brazilian, isolated from non-fatal cases of jungle yellow fever, and one Colombian, isolated from a rhesus monkey infected by the bites of wild *Haemagogus* caught in the forests of Volcanes.

In the first series of experiments a marmoset, *Callithrix aurita*, was inoculated with virus, and when the virus titre of this animal was high, *Aëdes aegypti* were fed on it. These mosquitoes were kept at 26° to 28°C. for 28 days and then fed on a normal marmoset. From then on the host-vector-host cycles continued until the ninth cycle. No marmoset exposed to bites failed to become infected and all showed virus when first tested on the 2nd or 3rd day ; 15 out of 17 died on the 4th to the 8th day. The two which recovered showed virus up to the 4th and 5th days respectively, and were immune when tested on the 21st day.

A similar series was carried out with *Cebus* monkeys, *Cebus versutus*, and *Aëdes aegypti*, through five complete cycles. All the exposed monkeys showed circulating virus, but only one out of 13 died of the infection. Those that recovered developed immunity. The virus was present in the circulation on the 3rd to the 5th days and may persist to the 7th day. The concentration was low compared with that found in the marmoset. Two cycles were also completed with the Colombian strain.

Another series was conducted, with marmosets and *Haemagogus equinus*. Only three cycles were completed, and four successful transfers obtained. There were also three failures, but in two the incubation period in the mosquito was near the minimum, and in the third failure only one mosquito was involved. In one experiment three *Haemagogus spegazzinii*, a species found in regions in Brazil where jungle yellow fever is endemic, were able to transmit the virus from an infected to a normal marmoset.

The results of these experiments support the view that the virus may be preserved in forested areas by passage through sylvan mosquitoes and monkeys, but do not exclude the possibility that other vertebrates and arthropods may play a rôle in the epidemiology of jungle yellow fever. *E. Hindle.*

LAEMMERT, H. W., Jr. & DE CASTRO FERREIRA, L. **The Isolation of Yellow Fever Virus from Wild-Caught Marmosets.** *Amer. J. Trop. Med.* 1945, May, v. 25, No. 3, 231–2.

A record of the isolation of yellow fever virus on four occasions from wild marmosets, *Callithrix penicillata*, caught between June 7th and August 13th in a sharply delimited locality in the neighbourhood of Ilhéus, Bahia, where jungle yellow fever is endemic. All four animals were in poor physical condition

when caught and died with gross lesions suggesting yellow fever, subsequently confirmed by animal experiments and histopathological examination. Later 1,437 other marmosets have been obtained without any more cases of yellow fever infection being discovered.

"Yellow fever virus has never been isolated previously from naturally infected vertebrates other than man." *E. Hindle.*

SMITHBURN, K. C. & MAHAFFY, A. F. **Immunization against Yellow Fever. Studies on the Time of Development and the Duration of Induced Immunity.** *Amer. J. Trop. Med.* 1945, May, v. 25, No. 3, 217–23. [13 refs.]

The authors investigated the results of immunization with the attenuated yellow fever virus 17D, in both monkeys and human beings.

Twelve rhesus monkeys were vaccinated subcutaneously, and after intervals ranging from one to fourteen days they were tested for immunity by the inoculation of a standard dose of yellow fever virus (Asibi strain). Protective antibodies were found to develop within six or seven days, but the monkeys were completely resistant at least 24 hours before the appearance in the serum of protective bodies, *i.e.* within five or six days after vaccination.

Ten adult male African volunteers, each non-immune to yellow fever, were similarly vaccinated, and protective antibody was found to be present in most cases by the 10th day after injection of 17D vaccine, and may be present on the 7th day. The results of post-vaccination surveys of immunity in persons inoculated in Africa with 17D vaccine prepared in New York indicate that 92·2 per cent. of soldiers sampled 1 to 22 months after vaccination showed protective antibodies. Ninety per cent. of civilians inoculated in Kenya gave positive protection tests 23 to 36 months after being vaccinated; more than 90 per cent. of persons vaccinated in Uganda had protective sera after 3 years, and there was no decline in the incidence of immunity in the third year. Finally, the percentage of children who became immune as the result of vaccination was as great as that of adults, and the antibody response was equally well maintained. *E. Hindle.*

FOREIGN OFFICE. **International Sanitary Convention, 1944, modifying the International Sanitary Convention of June 21, 1926.** Washington, Jan. 5 to 15, 1945. [Cmd. 6637 (Session 1944–45)] (Miscellaneous No. 7, 1945), 15 pp. London: H.M. Stationery Office. [3*d.*]

——. **International Sanitary Convention for Aerial Navigation, 1944, modifying the International Sanitary Convention for Aerial Navigation of April 12, 1933.** Washington, 5th–15th January, 1945. [Cmd. 6638 (Session 1944–45)] (Miscellaneous No. 8, 1945), 16 pp. London: H.M. Stationery Office. [3*d.*]

Further recommendations have been made on the delineation of yellow fever areas, to include part of N. Rhodesia and changes in S. America. [See *Bulletin of Hygiene,* 1946, v. 21, 1.]

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## PLAGUE.

ROTMAN, C. M. H. **Bubonic Plague in Dakar.** *J. Roy. Nav. Med. Serv.* 1945, July, v. 31, No. 3, 155–8.

Much of the interest of this account is due to the occurrence of the epidemic in the French port of Dakar. Infection of the rat population of the dockyard

seems to have come from "up-country" *via* the railway, but human bubonic plague is evidently an almost annual occurrence in Dakar itself.

Rodents along the two hundred mile coastal belt up to St. Louis and also in Senegal and in Mauretania are liable to epizootic plague. This is the animal reservoir from which Dakar becomes infected. The present considerable epidemic maintained an essentially native background. A vaccination campaign was started by the French authorities, who used the living, attenuated Madagascar vaccine. British and American personnel received the usual killed vaccine. Each individual vaccinated obtained a *passport sanitaire* which gave him a freedom of movement not permitted to the unvaccinated. Even those who had received killed vaccine, however, could not qualify for the passport without submitting to inoculation with living vaccine, because "the French medical authorities had no faith in the killed vaccine." A considerable reaction developed in many cases from the living vaccine in a dose of 1 cc. given in the scapular region, with the result that "many people had tissue sloughs at the site of inoculation." It appeared that "the French population and even the medical authorities took a detached view of the outbreak as they considered that plague in Dakar was a disease of natives only." When the human cases became more frequent and infected rats were no longer found, the possibility of transmission by human contact was considered. This led to the dusting of clothes of native dockyard workers with 10 per cent. DDT powder to kill fleas. Treatment of plague cases at the isolation hospital was symptomatic. An interesting documentary film of the outbreak was made and this may be useful for the training of public health workers.

*W. F. Harvey.*

WHEELER, C. M. & DOUGLAS, J. R. **Sylvatic Plague Studies. V. The Determination of Vector Efficiency.** *J. Infect. Dis.* 1945, July–Aug., v. 77, No. 1, 1–12, 1 chart. [21 refs.]

It is very desirable to have a simple standard measure of vector efficiency as a basis of comparison for different species. This vector efficiency, a numerical value determined experimentally, is represented by "the average number of transmissions effected by a given individual flea of any species. Any normal flea may be considered to have three inherent potentials: (1) Infection potential, (2) vector potential, and (3) transmission potential." [See this *Bulletin*, 1942, v. 39, 616, and 1943, v. 40, 695.] The details of experimentation should be consulted. After finding that a flea species was capable of transmission, the procedure was to feed the laboratory-reared flea, infected from an animal with a known bacteraemia, daily on single white mice as long as the flea lived. An example will make the mode of calculating efficiency clear. "If 100 fleas of the same species are given an opportunity to become infected and 80 of them acquire the infection, the *infection potential* would be 0·80. If, of the 80 infected fleas, 40 became infective, the *vector potential* would be 0·50. If the 40 infective fleas transmit the infection 80 times, the *transmission potential* would be 2. The product of these potentials—0·80, 0·50 and 2 represents the vector efficiency of the species tested." Four species of fleas were tested individually and gave the following vector efficiencies: *Ctenocephalides felis* 0; *Hoplopsyllus anomalus* 0; *Xenopsylla cheopis* 0·43; and *Diamanus* [*Ceratophyllus*] *montanus* 0·84.

*W. F. Harvey.*

RUMREICH, A. S. & WYNN, R. S. **A Study of the Rodent-Ectoparasite Population of Jacksonville, Fla.** *Pub. Health Rep.* Wash. 1945, Aug. 3, v. 60, No. 31, 885–905, 2 figs. [40 refs.]

SAVINO, E. Aplicación al hombre de la vacuna antipestosa cepa E. V. de Girard. [**Living Plague Vaccine for Man.**] *Bol. Sanitario.* Buenos Aires. 1943, Apr.–June, v. 7, Nos. 4, 5 & 6, 103–11.

It is evident that the use in vaccination of living, non-virulent, but immunizing, plague strains is making headway. The strain employed in the province of Córdoba, Argentina, was the E.V. strain of GIRARD. Thirty persons were vaccinated and careful notes made of reaction, with the following conclusion: None of the persons suffered any grave disability; all were able to continue at their daily work in spite of some pain, a little rise of temperature and local reaction. With the subsidence of this reaction there remained a small subcutaneous nodule. The author approves of the vaccine on the ground of its efficacy experimentally in the guineapig, and of some years' application in man. It should find a use especially in those districts where climatic conditions are favourable to development of plague outbreaks. *W. F. Harvey.*

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## BACILLARY DYSENTERY.

LAWRENCE, E. A. & BENNETT, R. E. **A Study of Diarrhea occurring at Army Air Force Headquarters, Calcutta, India.** *J. Amer. Med. Ass.* 1945, Sept. 15, v. 129, No. 3, 194–6.

An American air base was situated on the Hooghly River in the midst of a densely populated (about 14,000 persons within half a square mile) collection of Indian villages where extremely insanitary conditions prevailed. "The village streets and fields are littered with all kinds of debris. Decaying garbage, human and animal excreta and occasional foul-smelling carcases of dogs and bullocks left lying for days at a time are the usual conditions found."

From January to June 1944, 569 soldiers reported sick with diarrhoea and in July there were 205 cases, the sudden increase being due to the onset of the rainy season and increase in fly-breeding. A careful study of 198 consecutive cases of diarrhoea was made from July 11th to August 2nd; they included 31 cases of amoebic dysentery, 66 of bacillary dysentery, and 7 of both amoebic and bacillary dysentery. Fever was present in 16 of the amoebic dysentery cases and in 31 of the bacillary dysentery cases, hence it has little diagnostic value; tenesmus was present in 5 of the amoebic dysentery cases and in 19 of the cases of bacillary dysentery. Shigella organisms were isolated from 25 of the 66 cases of bacillary dysentery; no Shiga type was isolated.

Control measures included spraying of fly-breeding places with DDT or pyrethrum, fly-trapping and screening of buildings, and the resulting fly control was "dramatic and gratifying." Indians working in and near mess halls were given a daily dose of carbarsone, grain ½, for 10 days, and repeated stool examinations were made on food-handlers. From August 2nd to 23rd there were 21 cases of bacillary and 11 of amoebic dysentery, a slight decrease only, though there was a greater decrease in the total number of diarrhoea cases. American soldiers were also a reservoir of infection and, as many lived at the hotels for various periods, control could not be very complete.

The chief conclusions are that careful diagnosis is necessary so that thorough treatment may be given, and that sanitary discipline should be strictly maintained. *J. F. Corson.*

BOSE, A. N. & GHOSH, J. K. **Sulphanilyl Benzamide in the Treatment of Bacillary Dysentery.** *Indian Med. Gaz.* 1945, June, v. 80, No. 6, 293–4.

"Twenty-one cases of bacillary dysentery were treated with sulphanilyl benzamide; 16 were bacteriologically positive.

"The total dose required was only 14 grammes (28 tablets) for complete cure except in two cases with Shiga infection which required a little longer treatment. Almost all the patients were fit to resume work within five days. Stool culture was done up to three months with negative results in all cases. No relapse was seen up to a period of six months' observation. The drug is found to be non-toxic."

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## AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

SOFIA, F. & CIARAVINO, E. Inchiesta coprologica sui nativi dell' Eritrea. [**Faecal Examinations among Native Eritreans.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1944, v. 4, Nos. 5–6, 785–802. English summary (5 lines).

The authors have examined the faeces of 700 Eritreans in the Regina Elena Hospital, Asmara. They discarded those with obvious intestinal disturbance, in order to obtain a general idea of the degree of infestation among the people. They noted in each case the place of birth, changes of residence in recent years, occupation, and any history of earlier intestinal disturbance, but these points are not afterwards referred to in the record. The methods used were direct examination after a saline purgative and Willis's technique for helminthiasis, and the Teleman enrichment method, which gave much more satisfactory results.

The chief findings were: *E. histolytica* in 209 (29·8 per cent.), *E. coli* 187 (26·7), *Trichomonas* 46 (6·5), *Chilomastix* 27 (3·8), *Giardia intestinalis* 15 (2·1). The figures for *E. histolytica* are compared with a selection of those recorded from time to time in other parts of the world, notably, United States 11·6 (Craig), Brazil 9·3 (Pestana), Alexandria 13·7 (Wenyon & O'Connor), India and Mesopotamia 19·9 (MacAdam), Dutch Indies 24·0 (Brug), Jamaica 14·7 (Scott), Shanghai 10 (Fischer), and Venezuela 30 (De Bellard).

*Balantidium coli* was found once only. Of helminthic infestations the commonest was *Trichuris trichiura* 207 (29·5 per cent.), and next in order *Ascaris lumbricoides* 134 (19·1), *Ancylostoma duodenale* 132 (18·8). *Necator americanus* has been recorded by others, but the authors did not meet with a single instance. *Taenia saginata* 58 (8·2), *Hymenolepis nana* 34 (4·8), and *Enterobius vermicularis* 24 (3·4). All these were diagnosed by finding the ova in the faeces. *Schistosoma mansoni* was found 6 times only (0·8 per cent.). Finally, *Blastocystis* was seen in 21 (3 per cent.) *H. Harold Scott.*

SHIH LU CHANG. **Sedimentation in Water and the Specific Gravity of Cysts of** *Entamoeba histolytica.* *Amer. J. Hyg.* 1945, Mar., v. 41, No. 2, 156–63, 2 figs. [10 refs.]

In a specially designed chamber (2×1·5×0·5 cm.) the rate of sedimentation of cysts of *E. histolytica* suspended in distilled water was directly followed by observation through a horizontally placed microscope. Readings were made with a micrometer eye-piece. The sedimentation chamber was immersed during the observation in a mineral oil bath of uniform temperature in a larger glass chamber. The general result showed that in a sedimentation tank 10 feet deep, at a temperature of 25°C. cysts 15 microns in diameter would take approximately four days to settle. If water is subject to disturbances by wind or convection currents the settling time would be longer. Calculations by Stokes's law, based on the settling rates, gave a specific gravity for cysts of

1·060. It seems evident that storage of water must be long if it is desired to remove cysts of *E. histolytica* by sedimentation. The paper (illustrated by diagrams) describes in detail the technique employed. *C. M. Wenyon.*

MARUASHVILI, G. M. **On certain Differential Diagnostic Characters of Amoebic and Bacillary Dysentery.** *Med. Parasit. & Parasitic Dis.* Moscow. 1944, v. 13, No. 6, 57–62. [In Russian.]

A description is given of supplementary methods for the differential diagnosis of amoebic and bacillary dysenteries. It was found that counts of neutrophile leucocytes with " toxic granules " in blood films, proctoscopy and examination of the cell picture in the mucus, are of great help in cases when the usual methods of diagnosis fail. In bacillary dysentery the " toxic granules " are coarse, occurring in 53–88 per cent. of the neutrophils in acute cases, dropping to 15–47 per cent. in convalescents. In amoebic dysentery the granules are fine and they are found in 11–35 per cent. of neutrophils, subsequently falling to 8–18 per cent. Proctoscopic examination is regarded as a most important method for determining the form of dysentery, according to the morphological changes undergone by the mucous membrane of the large intestine. While amoebic dysentery is characterized by numerous solitary circular ulcers with uneven margins and a coating of whitish-yellow mucus, in bacillary dysentery the entire mucous membrane is involved. It is covered with layers of brownish mucus over large superficial ulcers which are circular or transverse. Further data are provided by examination of the mucus removed in the course of proctoscopy. This sometimes reveals the presence of amoebae microscopically or of dysentery bacilli in cultures, even when these cannot be isolated from the stools. Finally, much information can be obtained from the cell-picture of the mucus. In acute amoebic dysentery there are large numbers of neutrophils, erythrocytes, macrophages and epithelial cells, but eosinophils are absent ; however, in convalescent cases the last-named elements increase progressively in numbers, while the other elements decrease. On the other hand, in acute bacillary dysentery large numbers of pus cells, erythrocytes and changed epithelial cells are present, in addition to macrophages, crystals of fatty acids and bacteria. In convalescent cases of this disease the number of red blood corpuscles and pus cells diminishes visibly, while that of macrophages and epithelial cells increases, and solitary eosinophils begin to appear. *C. A. Hoare.*

CROPPER, C. F. J. **Sigmoidoscopy in Amoebic Dysentery.** *Lancet.* 1945, Oct. 13, 460–62.

The author, who writes from India, points out that the disturbingly high incidence of chronic bowel disorders in those who have served in the East demands high competence in the handling of the dysenteries. He urges a more accurate study of the bowel lesions of amoebiasis.

Sigmoidoscopic examination is desirable for the diagnosis of chronic bowel disorders in patients who give a history of residence in an endemic area of amoebiasis, in spite of the fact that the procedure has its limitations, and sometimes gives a negative result when there is active amoebic infection higher in the bowel. It is not necessary in fresh, acute cases, in which diagnosis can usually be made by stool examination, but in other cases it may give much valuable information. The symptoms of amoebiasis are so protean, that it should be performed as a precaution in :—(1) Sprue ; (2) any case in which amoeboma of the bowel, or pulmonary amoebiasis, is suggested ; (3) refractory cases of allergic disease, gastritis and headache ; (4) hepatomegaly and suspected liver abscess ; (5) unexplained loss of weight. It should never be carried out, however, without a logical indication.

The ideal room for sigmoidoscopy should be situated at one end of the dysentery ward. If the examination is timed for 9.30 a.m., the following enemas should be given :—7.30 a.m., half-strength soap enema ; 8 a.m. 2½ per cent. sodium bicarbonate enema. This procedure gives a very clean surface. No sedation is needed. The patient should be in the genupectoral or left lateral position, and while the tube is being passed up the bowel, attention should be concentrated on manipulation, the detailed examination being carried out during the process of withdrawal of the sigmoidoscope. For identification of the lesions a lens giving a magnification of 4–5 diameters is essential.

The *classical amoebic ulcers* vary in size, shape and distribution, from small areas 1/3 inch in diameter to almost total ulceration of several inches of bowel. The " unit of ulceration " is the classical flat, shallow depression, with undermined, congested edges and of irregular diamond shape. There is a yellow, purulent membrane with bright blood oozing scantily from its cracks and edges. There is no correlation between the duration of infection and the severity of the symptoms on the one hand, and the extent of ulceration on the other. These ulcers respond readily to emetine.

*Yellow-headed ulcers* are those in which bright, shining homogeneous sloughs are present ; they may be widely scattered and may be separated by mucous membrane of normal appearance.

*Pin-point craters* are the commonest lesions found, and may remain after the healing of the classical ulcers. The area in which they most usually occur is from 3 to 7 inches from the anus. They are seen as small dots, surrounded by heaped edges ; their average diameter is 1–2 mm. The valves are often affected, and the whole visible bowel may be peppered with them, giving the appearance of an aerial photograph of bomb craters on an airfield. These craters are not described in most standard works on amoebiasis, but though definite evidence that they are amoebic in origin is difficult to obtain, the author considers that they may justifiably be taken to indicate active amoebic infection. They are very refractory to treatment, but may gradually disappear, losing the central depression and resembling flat-topped cutaneous warts. For demonstration of these craters it is essential so to manipulate the sigmoidoscope that the mucosa is illuminated obliquely. [Pin-point ulcers occur also in rectal schistosomiasis, see this *Bulletin*, 1945, v. 42, 47.]

*Pigskin appearance* is a term applied to minute scattered pits, resembling pin-pricks on the surface of " Plasticine " ; the pits are very persistent, but may disappear. There can be little doubt of their amoebic origin.

*P. Manson-Bahr.*

SILVERMAN, D. N. & LESLIE, A. **Infractable Amebic Colitis, with special reference to the Ulcero-necrotic Form.** *J. Amer. Med. Ass.* 1945, Sept. 15, v. 129, No. 3, 187–90, 3 figs.

The term " ulcero-necrotic " has excellent descriptive qualities, but should be reserved for the type of case of which three are presented in this paper.

In the first two, *E. histolytica* trophozoites were demonstrated in all layers of the colon from mucosa to serosa. In the third, there was demonstrable extension to the submucosa. An unusual feature was the involvement of the entire colon in the ulcero-necrotic process, which in the past has seldom been observed in America.

The first two were complicated by secondary infections with dysentery organisms : Flexner in one and Duval (Sonne) in the other. It is possible, though not necessarily probable, that this combination of pathological processes results in the diffuse ulcerating and necrotizing process, which in one

case caused a major slough of the transverse colon and in the other a large mucosal slough of the recto-sigmoid.

Though the third case did not present the striking features of the other two, the fact that the entire colonic mucosa was destroyed by the ulcerative process warrants its inclusion in the series. All these cases were fatal, and details of autopsy findings are given.

*Case* 1 ran a sudden and acute course of less than three weeks' duration. The patient was febrile and severely ill. Six days after admission he passed a large tissue slough by rectum. The diagnosis was: rupture of the ascending colon; complete sloughing of the wall of the transverse colon; intense ulceration of the whole colon suggestive of bacillary dysentery; acute inflammatory hepatitis; general peritonitis; acute toxic splenitis and nephritis.

*Case* 2 had febrile diarrhoea with generalized abdominal pain for a year, with exacerbation of one week.

The distal foot of the ileum showed occasional shallow ulceration. The wall of the colon was decidedly thickened, and except for an occasional patch of red oedematous mucosa, had been completely undermined by acute and long-standing chronic cellulitis.

*Case* 3, a man of 68, was undergoing radiotherapy treatment for carcinoma of the bladder. He had in addition a febrile bloody diarrhoea of two months' duration.

The colon was adherent to the surrounding structures; there were many areas of necrosis, but no area of complete perforation. The mucosa was destroyed by ulceration which involved the entire bowel, including the caecum and rectum. Many amoebae were seen in microscopic sections in the necrotic zones.

An increase in incidence of this type of case in the United States may be foreseen as a result of the local dissemination of amoebiasis, and the importation of virulent strains of amoebae from the oriental and tropical theatres of war. *P. Manson-Bahr.*

DE SILVA, S. **"Significant Observations on Amoebic Hepatitis"—a Clinical Review of 200 Patients.** *J. Ceylon Branch Brit. Med. Ass.* 1945, Apr., v. 41, No. 1, 21–6, 3 charts.

In the General Hospital, Colombo, the number of cases of amoebic hepatitis and liver abscess, which averaged 88 in 1929, had swollen to 1,279 in 1944. The manifestations assumed so many different forms that they have afforded a rich field for investigation. In almost all cases the therapeutic test-response to emetine injections supported the clinical diagnosis. In a series of 200 cases pathological confirmation was obtained in 60 and X-ray confirmation in 45.

About 70 per cent. were admitted with pain over the right lower chest; this, together with sudden onset, high fever, scanty crepitations and occasional pleuritic rub, suggested pneumonia, and recourse was had to sulphapyridine therapy, without success; but directly emetine injections were substituted symptoms subsided. Previous and recent alcohol consumption is considered important; 176 patients confessed to excessive amounts over a period of 5–20 years, and it is suggested that alcohol may precipitate acute hepatitis in hitherto symptomless carriers. In 25 per cent. there was a history of vague abdominal pain, causing rigidity or guarding of the right rectus muscle and the "amoebic splash" in the right iliac fossa. Occasionally symptoms suggested an acute abdomen with appendicular colic—one with an anterior liver abscess simulated perforated gastric ulcer. A palpable epigastric tumour became apparent in 38.

In 68 the hepatic abscess was aspirated through the intercostal spaces, but in 12, further operative interference became necessary; in three a blood-stained pleural effusion at first suggested carcinoma. Previous dysentery was recorded in 52 during a period of 3–5 years, and the impression was obtained that a recent relapse determined the onset of hepatitis. In 12 the symptoms at first suggested haemorrhoids.

The pain of hepatic amoebiasis is dull, especially noticeable on deep inspiration or on coughing, causing the patient to incline to the left side. It is localized to the right lower intercostal spaces over the area occupied by the liver. Pain referred to the right shoulder or neck in 44, constituted a prominent symptom. Hepatitis pain is never referred to the lower abdomen, as may happen in basal pneumonia or pleurisy. It is intensified at night, aggravated by alcohol, by deep breathing and increased by percussion.

The increasing numbers of hepatitis cases are attributed to incomplete treatment of amoebic dysentery. *P. Manson-Bahr.*

SPADARO, O. L'epatite amebica (studio clinico). [**Clinical Study of Amoebic Hepatitis.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1944, v. 4, Nos. 5–6, 825–47, 5 figs. [105 refs.] English summary (8 lines).

The author's statements are based on 50 patients treated in the Regina Elena Hospital, Asmara, during the 5 years 1939–44. Forty were Europeans and 10 were Eritreans. Each year an average of 216 cases of intestinal amoebiasis has been found by microscopic examination, and this is below the real amount of infection, for statistics show that 29·8 per cent. of presumably healthy subjects yield positive findings of *E. histolytica* in their faeces [see SOFIA and CIARAVINO above]. In this connexion it is worth noting that of the 50 referred to in the present paper only 24 had given any history of an earlier entero-colitis and 21 were passing amoebae in their stools. Nine of the series, who had actual liver abscess and entamoebae in the stools, declared that they had never suffered from diarrhoeal attacks of any note, and 16 patients (12 of them Europeans) had never had any intestinal disturbance of any importance, although the entamoeba was present in their stools.

Nine of the 50 died; they had for long had enlarged livers. In 48 the abscess was in the right lobe. Early symptoms were debility, dyspepsia and enlargement of the liver, with fever. Anorexia, nausea and vomiting were often, but by no means always, present; the same applies to shivering attacks and sweating. Subicterus was present in 10; true jaundice in three only. Pain may be very acute and limited to the lower border of the liver; in others it may be more intense in the 9th and 10th intercostal spaces in the axillary line. Right-sided basal pleurisy was not infrequent. Leucocytosis was not very marked, up to 16,000 per cmm. in colliquative hepatitis. Radiology is of great help in diagnosis, a marked feature being immobility or restriction of movement of the diaphragm on the affected side, with enlargement of the liver. The chief complications are secondary infection, spread of the abscess and opening into the lung. Prognosis depends much on whether the abscess is single or multiple. OCHSNER's figures are quoted of 100 per cent. fatality in multiple cases and 10·5 per cent. in unilocular abscess. Another important point in prognosis is the treatment adopted. In the old days of ipecacuanha the fatality rate was about 12 per cent.; after emetine came into common use it was from 2·6 to nil. DOMINICI in Italy had a rate of 0·8 per cent. among 114 cases [one death presumably]. Other figures quoted are "38 cases with medical treatment and hepatocentesis 5·26 per cent.; 38 with surgical and medical treatment combined 28·42 per cent.; 17 with surgical treatment alone 29·92 per cent."

The author's patients have been treated with emetine, 90 cgm. in all; three injections are given daily, each of 3 cgm.; after 45 cgm. have been given (5 days) an interval of 10 days is allowed to elapse during which stovarsol or yatren is given. In the colliquative forms the emetine treatment is combined with evacuation of the abscess cavity and washing out with a solution of emetine. Good results have followed collapse therapy of the abscess cavity by means of Potain's aspirator. Cures have been attained in 20 days in this way, but emetine treatment has been maintained by a course every three months for about a year. Details of six cases are given in an appendix.

*H. Harold Scott.*

PICARD, H. & BENSIMON, T. **Skin Amebiasis.** *Acta Med. Orientalia (Palestine & Near East Med. J.).* 1945, Aug., v. 4, No. 8, 262–4.

Amoebiasis of the skin is easily diagnosed if suspected but is often unrecognized; it is almost certainly fatal if specific treatment is not given but treatment with emetine is effective.

It is probably not extremely rare, as 74 proved and 26 suspected cases were reported in 1940; in the present paper the authors record 7 cases, in 5 of which [4 according to the text] *E. histolytica* was found. The areas of skin affected were: at the incision for operation for liver abscess (1); at the incision for appendicectomy (2); and the perianal skin (1).

The authors think that a debilitated state of health, increased virulence of the amoebae, and perhaps the presence of other infections may be contributory causes.

Treatment is by emetine injections; in very rare cases where this may fail, wide excision of the area may be required. *J. F. Corson.*

CLELAND, J. B. **Amoebic Infection of the Vulva complicating Granuloma Pudendi.** *J. Trop. Med. & Hyg.* 1944, Oct.–Nov., v. 47, No. 5, 54–5.

KERN, F., JR. **Amebic Pericarditis.** *Arch. Intern. Med.* 1945, Aug., v. 76, No. 2, 88–92, 2 figs.

"In a case of amebic pericarditis subsequent to extension of an amebic abscess of the liver, the clinical impression was that of tuberculous pericarditis, and the diagnosis was established only at autopsy."

EDINGTON, A. D. **A Simple and Practical Method of treating Amoebiasis.** *South African Med. J.* 1945, Aug. 25, v. 19, No. 16, 294.

The treatment recommended in this paper is presumably intended for cases of chronic amoebiasis of the intestine as it does not prevent the patient from doing his daily work. Emetine bismuth iodide is given in 3-grain doses on an empty stomach early in the morning accompanied by a drink of half a tumblerful of ice-cold water; the patient at once lies on his right side and remains so for an hour. This dose is given daily for 10 days. The course is followed by a "carba[r]zone treatment of 20 tablets which are taken twice a day [0·25 gm. *bis die* for 10 days ?] and if the patient finds HCl does not induce dyspepsia or heartburn, he takes 5–15 drops in a large drink of water after each meal."

The author treated 107 patients suffering from amoebiasis and most of them were able to enjoy their breakfast during the course; a few vomited once or twice and in some the drug caused mild diarrhoea, but all completed the course. At the end of treatment only two patients showed a few cysts and only one had any toxic effects—"mild sciatic pains" in the legs. No relapses have occurred in the cases followed up.

The gastric juice was examined in 67 cases of amoebiasis ; the great majority of these patients had hypochlorhydria and several had achlorhydria, while only two had " a very slight degree of hyperchlorhydria." *J. F. Corson.*

PESSÔA, S. B. & AMARAL, D. F. Ação da emetina sôbre a " Endamoeba histolytica " em cultura, como teste do seu valor amebicida. [**Action of Emetine on *Entamoeba histolytica* in Culture as Test of its Amoebicidal Value.**] *Brasil-Medico.* 1945, July 7 & 14, v. 59, Nos. 27 & 28, 241–4. English summary.

The authors have found that *E. histolytica* will grow well in a medium consisting of a solid base of coagulated ox serum covered with Locke's solution to which a quantity of defibrinated ox blood has been added. The amoebicidal action of emetine and cephalin were tested by adding solutions of various strengths to cultures maintained at a *p*H of 7·4 to 7·6 and at a temperature of 37·5°C. It was found that emetine was amoebicidal and hindered growth when the concentration in the medium was 1 in 20,000, while cephalin ceased to be amoebicidal at a dilution of one in 10,000. The action of cephalin was not altered by boiling or autoclaving the solution before testing it.

*C. M. Wenyon.*

AMIN, N., MAHFOUZ, M. & SHERIF, M. A. F. **The Pharmacological Action of Quassin as compared with Emetine.** *Quart. J. Pharm. & Pharmacol.* 1945, Apr.–June, v. 18, No. 2, 116–21, 4 figs.

The author has made a pharmacological study of quassin and compared it with emetine hydrochloride with special regard to its action in causing depression of the heart and a lowering of the blood pressure. He has also studied the action on cilia of the toad's buccal membrane, trichomonas from the caecum of guineapigs and *Entamoeba histolytica* from cases of amoebic dysentery. In all these tests quassin was superior to emetine. It proved to be non-toxic to animals in large doses and only depressed the heart and lowered the blood pressure in high concentrations. It was also more effective than emetine in its action on the cilia and the protozoa. Quassin was accordingly tried by intramuscular injection in certain cases of acute amoebic dysentery, and the results are said to have been encouraging. [It seems exceedingly doubtful if *in vitro* observations on amoebae and trichomonas while in faeces justify conclusions as to the relative activity of the substances tested.] *C. M. Wenyon.*

LÁNG, S. Ueber die intravenöse Urotropinbehandlung der Lamblia-Cholecystitis. [**Treatment of Giardia Infection by Intravenous Injections of Urotropin.**] *Schweiz. med. Woch.* 1945, Aug. 4, v. 75, No. 31, 679–80.

The author discusses the various views that have been held regarding the pathogenicity of *Giardia*, particularly from the point of view of cholecystitis. He notes that some observers consider the main habitat of the flagellate to be the duodenum, while others hold that the gall bladder is the main seat of infection. Observers are fairly well agreed that when samples of bile are withdrawn by duodenal tubage it is in the B fraction that the greatest number of *Giardia* are found, while it has been claimed that in three cases in which the gall bladder had been removed for cholecystitis the flagellates had been found in the bile inside this organ. Furthermore, it has been observed that treatment with bismuth or stovarsol will cause the *Giardia* to disappear from the duodenum for some days, but they reappear, presumably because these drugs have no action on the contents of the gall bladder. The author admits, however, that other observers

have failed entirely to find the flagellates in gall bladders removed for so-called *Giardia* cholecystitis. He favours the view that symptoms of cholecystitis are due to invasion of the gall bladder and he is supported in this conclusion by his observation that in a number of cases intravenous injections of urotropine, which is known to be excreted in the bile, have brought about not only an eradication of the infection but complete relief from all symptoms. The treatment has consisted in the daily intravenous injection of 10 cc. of a 40 per cent. solution of the drug for four to six days. The action of the drug was controlled by duodenal tubage. *C. M. Wenyon.*

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## RELAPSING FEVER AND OTHER SPIROCHAETOSES.

STUART, G. **Relapsing Fever in North Africa and Europe, 1943–1945.** *Epidemiological Information Bull.* (*UNRRA Health Division*). Washington, D.C. 1945, July 15, v. 1, No. 11, 453–64.

The author refers to the epidemic of louse-borne relapsing fever recently present in Tunisia, Algeria and Morocco, and gives a historical survey of outbreaks in that area and in other French African possessions since 1919. The present epidemic probably originated in Fezzan, and began in Tunisia in September 1943. In 18 months there were 30,744 cases in Tunisia alone, and during the latter part of 1944 and the early part of 1945 there were 5,062 cases in Algeria and 667 in Morocco. The epidemic was still raging, according to the last available returns, in February–March 1945.

In Tunisia the disease was at first mild, but as the epidemic extended, severity increased and the case mortality rate reached 10–12 per cent.

In Europe, 578 cases of tick-borne relapsing fever were reported in 1943–44 from Spain, and the louse-borne form has recently been recorded from Turkey, Rumania, N. Ireland and England. In Greece and France there have also been cases, the latter in maritime areas having connexions with N. Africa. The tick-borne form is not uncommon in Tunisia where *Ornithodorus erraticus* is widely distributed and where *O. savignyi* (a potential vector) is found towards the south. *Rhipicephalus sanguineus*, also a potential vector, is found in Algeria. " Three recognized carriers of the disease have been recorded from Libya, viz., *O. moubata, O. savignyi* and *O. laborensis* " [presumably *O. lahorensis*] ; it is said that tick-borne relapsing fever occurs there.

In the French experience of louse-borne relapsing fever, stovarsol was ineffective, but with novarsenobenzol or mapharsen the results were very good. The optimum doses for an adult weighting 60–65 kgm. were :—

Novarsenobenzol :—0·6 gm. the first day, 0·75 gm. the following day and one stimulating dose a week later.

Mapharsen :—0·06 gm. the first day and the same the following day.

*Charles Wilcocks.*

WOOD, R. C. & DIXON, K. C. **Tick-borne Relapsing Fever in Cyprus.** *Brit. Med. J.* 1945, Oct. 20, 526–8, 1 fig.

The authors noticed that cases of relapsing fever were occurring in Cyprus among soldiers who had passed the night in caves or dungeons. A careful search of caves where infection had occurred revealed the presence of *Ornithodorus tholozani*, a known vector of relapsing fever, which has not previously been recorded in Cyprus.

Twelve cases are described in detail. No lice were found on any of these patients, and in all cases there was either direct or indirect evidence of exposure

to the bites of ticks. The incubation period was usually 8 to 10 days. In two cases long periods of low continuous fever occurred as well as acute attacks of high pyrexia. Choroiditis was seen in one case and papillitis in four others. No other neurological complications were noted except changes in the cerebrospinal fluid. The urine was examined for urobilin in seven cases and marked urobilinuria found in six of them. All the cases were treated by intravenous arsenicals; five relapsed but only two more than once.

In an appendix, one of the authors, K.C.D., records that he had succeeded in infecting guineapigs by the inoculation or blood from another case of relapsing fever in Cyprus. This supports the view that the causative organism is *Spirochaeta hispanica*, the tick-borne strain of relapsing fever spirochaete which is found in other Mediterranean countries. *E. Hindle.*

MARUASHVILI, G. M. [**On the Tick-borne Relapsing Fever.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1945, v. 14, No. 1, 24–7. [In Russian.]

This paper deals with the occurrence in the Caucasus of tick-borne relapsing fever, which was first noted there in 1928, since when only a few cases have been recorded. The disease is caused by *Spirochaeta caucasica* and is transmitted by *Ornithodorus verrucosus* which is found exclusively in burrows and caves inhabited by wild rodents (*Pallasimus* [*Pallasiomys* ?] *erythrourus caucasica* [=*Meriones erythrourus caucasicus* ?], *Apodemus silvaticus* and *Mus musculus*), representing the reservoir hosts of the infection. Man becomes infected only when coming into contact with these biotopes [habitats]. The author records his observations on seven patients who were admitted to an evacuation hospital with a mistaken diagnosis of malaria. The incubation period is 6–10 days, the onset of the first paroxysm of fever is sudden, and it lasts 2–4 days, with a temperature up to 39–41°C. The subsequent paroxysms are usually of short duration, lasting up to 10 hours and terminating abruptly with copious perspiration. These paroxysms may at first recur every other day or every third day, resembling benign tertian and quartan malaria, but later the apyrexial intervals gradually increase in length, sometimes lasting more than one month. The number of relapses may reach 12–15, the duration of the disease being up to 3 months. Among other symptoms the author notes a transient functional cardiovascular insufficiency, nausea and even vomiting during the first paroxysms of fever. The reaction on the part of the spleen and liver is very slight, and there are no characteristic changes in the blood picture.

In the early phases of the disease, Caucasian tick relapsing fever can be confused with malaria. Its differential diagnosis is based on the finding of spirochaetes in the blood of the patient or in experimentally infected hamsters. The disease was treated successfully with "osarsol," in doses of 0·25 gm. given three times a day during 3–5 weeks. *C. A. Hoare.*

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## YAWS.

TOMPSETT, R. R. & KAUER, G. L. **Penicillin Treatment of Early Yaws.** *Amer. J. Trop. Med.* 1945, May, v. 25, No. 3, 275–6.

Five cases of yaws in Melanesians of "the New Guinea area" were treated with penicillin; one patient was given 250,000 units in doses of 25,000 units intramuscularly every 4 hours, while the other four each received 400,000 units in doses of 20,000 intramuscularly five times daily at intervals of 4 hours.

Spirochaetes could no longer be found 15 to 24 hours after the beginning of this treatment and the lesions healed within 3 weeks. The Kahn reaction remained positive during the few weeks of observation, but could not be observed longer as the patients disappeared when the lesions were healed.

*J. F. Corson.*

GUIMARÃES, F. N. Penicilina e bouba (Framboesia, Pian, Yaws). Dóse curativa mínima. Redução do número de injeções diárias. Redução do tempo de tratamento pelo aumento das dóses. (Nota prévia.) [**Penicillin and Yaws.**] *Brasil-Medico.* 1945, June 16, 23 & 30, v. 59, Nos. 24, 25 & 26, 221–4, 6 figs. English summary.

This is a short article published as a preliminary note, but it considers several points of importance, as shown in the subtitle: the minimal curative dose, the results of using smaller doses or of using larger doses over a shorter period. Experimentally, spirochaetes in animals had proved to be very susceptible to the action of penicillin, so it was decided to test its action in human spirochaetoses.

First, with doses of 150 or even 100 Oxford units, intramuscularly administered every four hours, clinical cure was obtained in 17 days, the former with a total dosage of 15,300 units in a girl of 9 years, the latter with 10,300 units in a girl of 10 years. Another child of 10 years was given 50 units every 4 hours over a period of 40 days (12,000 units in all), but without obtaining clinical cure.

Next, tests were made to ascertain the results of reducing the number of daily injections. With doses of 400 units three times a day, cure was obtained in 14–16 days, *i.e.* with a total dosage of 16,800 and 19,200 units. With two injections daily, each of 400 units, clinical cure resulted in a child of 2 years after 16 days' treatment and in one of 11 years after 23 days' treatment. To two children a single daily dose was given: one, a girl of 9 years, received 3,200 units daily and was cured in 20 days. The other was the boy who had failed to respond to the 50 units every 4 hours after 40 days (see above). He was given a single dose of 1,600 units daily for 30 days (total 48,000 units) and was cured.

All the patients referred to above were children—the oldest was 11 years of age; for adults the author states that these doses should be doubled.

Thirdly, the trial of increasing the doses and reducing the period of administration was made. The dosage was graded according to the body-weight. To a youth of 16 years weighing 42 kilos a dose of 46·7 units per kilo was given every 4 hours and cure was obtained in 15 days; the same occurred in children of 4 to 12 years with doses of 33·3 units per kilo every 4 hours. It is to be noted that in none of these three were any spirochaetes seen in the lesions 72 hours after the treatment was started, but it was continued nevertheless for several days "to consolidate the cure and to obtain reversal of the Wassermann reaction."

*H. Harold Scott.*

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## LEPROSY.

MARIANO, J. Pênfigo bolho-esfoliativo e lepra. [**Exfoliative Pemphigus and Leprosy.**] *Rev. Brasileira Leprologia.* S. Paulo. 1945, June, v. 13, No. 2, 103–6, 2 figs.

A leper woman of 42 years, clinical type N1, developed a bullous rash on the thorax which was at one time thought to be pemphigus foliaceus, but the

bullae were associated with ulcerating and scabbing areas. "The type and localization of the lesions by themselves rule out the possibility of Duhring's disease," says the author [but dermatitis herpetiformis commonly occurs on the trunk]. *H. Harold Scott.*

CAMPOS, N. S. & SOUZA, P. R. Lepra e sifilis. Leprides sifilóides e sifílides lepróides. [**Leprosy and Syphilis.**] *Rev. Brasileira Leprologia.* S. Paulo. 1945, June, v. 13, No. 2, 77–94, 17 figs.

This paper deals with an important and puzzling question—the resemblance between certain lesions in leprosy and those in syphilis. Lesions may bear so strong a resemblance to each other—syphilis-like leprides and lepra-like syphilides—that a wrong diagnosis is likely to occur and valuable time be lost before the appropriate treatment is undertaken.

The similarities are duly shown by the authors, notably the roseolar exanthem of leprosy to that of syphilitic roseola; tuberculoid leprosy to certain late secondaries in syphilis. Distinctions, on paper at least, are not easily recognized, being matters of degree rather than of kind. Thus, in roseolar exanthemata of leprosy the patches are larger than in syphilis, and in the latter they are more homogeneous and equal in size and evolve more rapidly. As for the tuberculoid lesions, they are less polymorphic in leprosy than in syphilis and their development is slower, taking 6 to 12 months. The Wassermann reaction may help, especially if negative, but it may be positive in some lepers; the clinching diagnostic point is the finding of the organism by biopsy.

Excellent photographs illustrate the paper, but it must be confessed (by the abstracter at least) that they afford less enlightenment than one hoped. They bear appropriate legends, otherwise it would be difficult to distinguish, for example, Fig. 1, a tuberculoid leprosy, from Fig. 13, a late secondary syphilide. Cases of papulo-tubercular syphilis simulate, it will be seen, to an extraordinary degree instances of severe facial lepromata. To one photomicrograph depicting the histological changes in a syphilitic is the legend "granulation of tuberculoid structure indistinguishable histologically from that met with in tuberculoid leprosy." *H. Harold Scott.*

LIMA, L. de S. & CERQUEIRA, G. de C. Terapeutica experimental da lepra pela solutiazámida. [**Treatment of Leprosy with "Solutiazamide".** *Rev. Brasileira Leprologia.* S. Paulo. 1945, June, v. 13, No. 2, 97–100.

"Solutiazamide" is stated to be p. (y-phenyl propyl amino) phenyl sulphamidothiazole-x-y-disulphonate of sodium and prepared directly from sulphathiazole, and is very readily soluble in water. A solution of 45·3 per cent. corresponds to a 20 per cent. sulphathiazole base. It was administered daily (except Sundays), intravenously in doses starting with 1 cc. and increasing up to 5 cc., or, for adults, 10 cc. After three weeks an interval of one week is allowed to elapse before the treatment is continued. The treatment is controlled by a blood count and haemoglobin estimation every 10 days, examination of the urine and any deposit, and an estimation of the drug in the blood. If the red cells fall below 3½ million per cmm., the dose of the drug is reduced and liver preparations are given; the urine is examined for blood and albumin or any indication of nephrosis, and if it appears treatment is suspended.

The new drug was tried in 50 cases of moderately developed lepromatous forms, and others more advanced, 50 cases of lepromata with skin involvement and lesions of eyes and nose and some in whom chaulmoogra had been tried ineffectually. The authors publish their results in order that others may be led to make trial of the drug. So far reported these results sound almost too

good to be true. The authors report: rapid cicatrization of leprous ulcers, cicatrization of fusing lepromata, disappearance of lepromatous infiltrations to the level of the skin, softening and disappearance of cutaneous nodules; perforating ulcers are sometimes benefited; the ocular lesions improve and do not relapse, nasal crusts disappear, obstruction is relieved and dyspnoea subsides. *H. Harold Scott.*

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## HELMINTHIASIS.

SHUMEIKO, A. I. **On the Degree of Infestation of Vegetables and Fruit with the Eggs of Helminths in Samarkand.** *Med. Parasit. & Parasitic Dis.* Moscow. 1944, v. 13, No. 6, 77–8. [In Russian.]

The author describes the results of examination of vegetables and fruit from the bazaars of Samarkand for the presence of eggs of helminths. Investigations were made at different periods in 1937/8 and 1942/3, using the following method. Each portion to be examined was carefully washed twice by hand in 500 cc. of tap-water (total volume of water=1 litre). The water was then passed through a metal sieve (diameter 2 mm.) into a vessel, in which the height of the water varied from 6 to 15 cm. The washings were allowed to settle for 2–3 days or longer, after which the water was siphoned off and the deposit poured out into centrifuge tubes (1–2 cm. per tube). After centrifugation for 3 minutes, the supernatant water was decanted, Darling's reagent was added to the tube, the contents were carefully mixed with a glass rod, and centrifuged again for 3 minutes. The surface film was then removed with a metal loop and examined under the microscope. The total number of samples of vegetables thus examined was 210, in which were found 44 onchospheres of tapeworms and four threadworm eggs. *C. A. Hoare.*

HODGE, E. H. V. **Intestinal Infestations.** *Practitioner.* 1945, Nov., v. 155, No. 5, 306–12. [27 refs.]

A summary of recent work.

BLACK, K. O. **Cutaneous Schistosomiasis involving** *S. haematobium* **Eggs.** *Brit. Med. J.* 1945, Oct. 6, 453–6, 3 figs.

This interesting paper records the occurrence of bilharzial skin lesions on the trunk of certainly two, and probably four, of 130 male Europeans harbouring *S. haematobium.* All four cases were presumably heavily infected with the parasites, as they had been repeatedly exposed to cercarial attack over a period of a month or more in West Africa. Each experienced skin sensations and developed skin lesions at the time of infection, and each went through the classical febrile reactive stage of bilharziasis before ova appeared in the stools some three months after the initial infection. In only three of the four cases did ova subsequently also appear in the urine.

*Case I.*—On being specifically diagnosed was promptly treated with 40 cc. of stibophen intramuscularly over a period of 15 days. On the seventh day of treatment he drew attention to some herpetiform lesions in the skin below the right nipple. Shotty papular lesions then developed on the lower chest, upper abdomen, lower back, upper buttock, scrotum and perineum. Repeated aspirations of the lesions yielded *S. haematobium* eggs on many occasions.

*Case II.*—On diagnosis by stool examination was also immediately treated with stibophen. Again, one week after starting treatment, papular lesions were

noticed, in this case in the left lumbar region. Similar lesions appeared on the lower left chest and these on aspiration yielded *S. haematobium* ova. Four further clusters of lesions and some scattered isolated papules developed in the left lumbar, the sacral and gluteal regions in this case.

*Case III* was a mixed *S. mansoni* and *S. haematobium* infection, with two similar clusters of papules in the lumbar region; but ova were not recovered from these.

*Case IV* was also a *S. haematobium* infection, with a group of spots to the right of the umbilicus but, here again; ova were not recovered from the lesions.

Owing to the similarity of the skin manifestations in all four cases it is reasonable to assume that all were of similar origin.

The author, in discussing the matter, points out the similarity at some stages of the skin lesions he describes to those seen in the bladder or the bowel on endoscopy; and, he believes, they resemble the cutaneous manifestations described by MADDEN [this *Bulletin*, 1919, v. 14, 339] and by GIRGES [*ibid.*, 1934, v. 31, 907]. In his own cases, however, the lesions did not go on to the ulceration and sinus formation described by these authors. He speculates on the route by which the worms depositing the causative ova reached the site of their recovery in the skin, and suggests that they may have ascended the scrotal, gluteal and lumbar veins from the iliac veins and vena cava; or travelled by the venous communications between the lumbar and epigastric veins; or by the inferior epigastric from the external iliac veins. Some of the recovered eggs were dead and degenerate, others were healthy and viable.

*A. R. D. Adams.*

MILLER, S. E. **Schistosoma Hematobium Infection.** *J. Amer. Med. Ass.* 1945, Sept. 29, v. 129, No. 5, 344–7, 5 figs.

Report of a case.

MARIANI-TOSATTI, G. Bilharziosi intestinale da Sch. Mansoni in Eritrea. Descrizioni clinico–anatomo-istologiche. [**Schistosomiasis mansoni in Eritrea.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1944, v. 4, Nos. 5/6. 803–13.

In 1936 Dr. SATTA noted and recorded the presence of *Schistosoma mansoni* in the higher levels of Eritrea [this *Bulletin*, 1936, v. 33, 553, 953]. The author remarks that Clayton LANE maintained that this schistosomiasis was absent from Eritrea. [This is a mistake which the present author should not have made. Lane had stated (*ibid.* p. 11) as regards Eritrea, "no accounts have come to light" and this, as Lane maintained (p. 953), is very different from affirming that the infestation is non-existent.] Three new cases are here recorded, two from the neighbourhood of the original focus in the Marazzani Concession, the third from near the village of Toselli, 4 kilometres from Decameré. All three were in children, 10 years old. The first two had bathed in the same stream, had felt intense itching of the legs and later suffered from fever, urticaria, and muco-sanguineous diarrhoea with abdominal pains. The symptoms persisted for some months but, after coming to hospital, the patients were treated with Fouadin and made good recoveries. The third child bathed in a brook near his home. He felt severe itching, especially on the legs, and 10 days later had a very irritating diffuse red rash, and, a few days after, diarrhoea with four to six motions daily containing mucus and blood. He had previously suffered from taeniasis and he passed some proglottides. He was now treated for this last with satisfactory result. He seemed better for 3 weeks or so, but then became rapidly worse with malaise, shivering, intermittent fever and muco-sanguineous diarrhoea; within the next fortnight he

became pale, lost weight and suffered from an irritating cough and shortness of breath, was admitted to hospital (three months after the incriminated bathing) and he died a fortnight later. At autopsy the lungs showed nodular infiltrations containing ova of the schistosome, as did also the peritoneum. The general structure of the liver was retained but the central parts of the lobules showed intercellular oedema, the Kupffer cells were increased in number and were stuffed with black granules; in the sinusoids were small-cell infiltrations and there was general biliary cirrhosis. The spleen showed marked increase in the reticular tissue and some increase in the trabecular connective tissue. The organ was enlarged and weighed 300 gm. The intestine had a much thickened mucosa, stuffed with ova, "about 60 per field"; a few were present also in the muscular layers. The kidneys revealed nothing particular to note. *H. Harold Scott.*

KHALIL BEY, M., HALAWANI, A. & GAMAL NOR EL DEEN. **The Problem of Post-Antimony Jaundice in Egypt.** *J. Roy. Egyptian Med. Ass.* 1945, May, v. 28, No. 5, 192–206. [13 refs.]

Following the mass treatment of the population in one district in Egypt for bilharziasis with two trivalent antimony compounds, jaundice occurred in a number of patients. About 3 per cent. were affected in 8,000 cases treated with tartar emetic given intravenously while there was only one case of jaundice among 2,000 cases treated intramuscularly with stibophen. The jaundice occurred 1–3 months after treatment, the greatest incidence being at the end of the longer period. The condition was accompanied by slight fever and certain constitutional disturbances among which gastro-intestinal symptoms were marked, and the period of upset lasted several weeks. Clinically the cases resembled those due to infective hepatitis but the incubation period was longer. It was later found that jaundice has occurred in some communities in the absence of antimony treatment. The presence of infective material in imperfectly sterilized syringes was therefore suspected, and this view appeared to be confirmed when adequate measures for their sterilization were introduced. *J. D. Fulton.*

SOTOLONGA, F., ALFONSO, J. & DEL VALLE ALEMÁN, S. Inermicapsiferosis. Revisión general en ocasión del estudio de un caso procedente de Santa María del Rosario. [**Inermicapsifer Infestation. A General Account and Report of a Case.**] *Rev. Med. Trop y Parasit.* Habana. 1945, May–June–July–Aug., v. 11, Nos. 3 & 4, 37–40.

LAPTEV, A. A. [**Strongyloidiasis of the Lungs.**] *Klinicheskaia Meditsina.* Moscow. 1945, v. 23, No. 3, 75–6. [In Russian.]

The author describes a subject infested with *Strongyloides* [the species is not stated] in whom the symptoms were pulmonary, intestinal symptoms being absent. Larvae of *Strongyloides* were found in the sputum only.

The subject was a Moscow carpenter, aged 34, who had not left that city. At first he suffered from sharp attacks of dyspnoea with slight cough and expectoration of small quantities of odourless, muco-purulent sputum which was free from blood. His temperature was 37·8 to 38·3°C. A slightly-itching urticaria appeared over the whole body, followed by oedema of the face and lower extremities; both these lasted only 24 hours. The next day the subject's condition was serious. In hospital a general examination revealed little except bubbly râles in the right scapular region and, by X-ray, a diffuse, inconspicuous darkening of the whole right pulmonary field, especially in the region of the right scapula. Right-sided bronchopneumonia was diagnosed.

There was an eosinophilia of 22·5 per cent. Neither *Strongyloides* nor its eggs were found in the faeces, but freely-moving, mature *Strongyloides* were found in the sputum. On the sixth day after admission to hospital 3–20 specimens per preparation were found, but three days later there were only isolated specimens. Two days later still neither *Strongyloides* nor its larvae could be found in the sputum.

The bronchopneumonia was treated with 1·0 [presumably gm.] of "sulphidine" [sulphapyridine] four times daily, but the subject's condition continued to be grave, the high eosinophilia remained and some 50 cc. of sputum were voided in 24 hours. More careful examination of this sputum revealed mature *Strongyloides* in it. The subject was then given 20 cc. of 33 per cent. alcohol intravenously and simultaneously 0·1 [presumably gm.] of methylene blue by the mouth in gelatine capsules. After three such doses of alcohol the dyspnoea decreased, the sputum came away freely, the cough improved and the temperature became normal. In the sputum only isolated *Strongyloides* were found and after eight doses of alcohol they completely disappeared. A total of 20 such doses of alcohol was given. The methylene blue was continued for 15 days. Eventually the X-ray picture of the lungs became normal, *Strongyloides* could not be found in the sputum and the subject was discharged in very good condition.

The author remarks that *in vitro*, extract of male fern kills larvae of *Strongyloides* in 10 minutes. After mentioning various remedies for strongyloidiasis, the author refers to Faust's opinion that gentian violet has a specific action on *Strongyloides* [*cf.* Craig and Faust, Clinical Parasitology, 3rd edn., 1943, p. 253, London: Henry Kimpton, where intravenous administration of not more than 25 cc. of 0·5 per cent. aqueous solution of gentian violet on alternate days for not longer than ten days is recommended for pulmonary infestation with *Strongyloides*]. *G. Lapage.*

Hilmy, I. S. **The Effect of the Flooding Method of Sewage Disposal on the Viability of the Eggs of** *Ascaris lumbricoides*. *J. Roy. Egyptian Med. Ass.* 1945, May, v. 28, No. 5, 207–14.

The health authorities at Cairo are concerned as to the possibility of disease being spread from the use of human excreta for fertilizing purposes. Biological treatment of sewage will destroy pathogenic organisms, but the question of the survival of *Ascaris* ova is another matter, since this ovum is one of the most resistant of all helminthic ova and the worms are very fertile. Before the "Flooding method" of dealing with sewage was introduced these ova would survive without much difficulty. Now, the following is the procedure: Liquid sludge and scum from sedimentation tanks are pumped on to drying beds, each of an area of 49 sq. metres, and spread as a thin layer and left to dry for 5 days in summer, 8 days in early spring and late autumn. Then another layer is applied and so on till as many as 20 layers may have been deposited. It is then covered with half an inch of sand and flooded with sedimented sewage and left for a fortnight, then turned over and in 2–3 days (in summer) the whole is dry enough to distribute as manure. Thus, about three months are needed for the whole process.

Examinations for viable ova of *Ascaris lumbricoides* were made after the four 3-monthly periods. Briefly stated, the results were that no viable eggs were found in samples from the beds prepared from March–June, June–September and September–December, but they were present in those prepared in the remaining quarter, December–March, after 10 days' storage. After 25 days storage by the ordinary piling method in this last period viable eggs were still

present, but not after 30 days' storage. The latter is, therefore, more economical for the December–March period and this is, fortunately, not the fly-breeding season ; the Flooding method is best for the rest of the year. It is not only a good method of sewage disposal but the fertilizer resulting therefrom is safe and free from viable eggs of *Ascaris*. *H. Harold Scott.*

NEWTON, W. L., WRIGHT, W. H. & PRATT, I. **Experiments to determine Potential Mosquito Vectors of *Wuchereria bancrofti* in the Continental United States.** *Amer. J. Trop. Med.* 1945, May, v. 25, No. 3, 253–61. [12 refs.]

As many American soldiers and sailors have returned to the United States suffering from filariasis, the authors made experiments to see whether mosquitoes in the United States could transmit the infection ; the experiments were begun in Porto Rico with species of mosquitoes common to that island and to the United States, and later were continued in Alabama.

Between July 1943 and October 1944 a total of 2,371 mosquitoes, comprising 16 species, fed on infected volunteers ; a short description of the feeding peculiarities of each species is given. After various intervals, beginning 9½ days after feeding, the mosquitoes were killed and dissected ; the wings and legs were removed and the mosquito was divided into abdomen, thorax and head, and these parts were teased in normal saline under the dissecting microscope.

The development of the microfilariae corresponded with the textbook descriptions ; in most of the species in which full development took place, it was complete within two weeks.

Altogether, 1,801 dissections of 15 species and 49 of *Culex tarsalis* were made, the former being shown in a table, the latter being added in a postscript. The results indicated that *Culex quinquefasciatus* [*C. fatigans*], *Culex tarsalis*, *Psorophora confinnis*, and *Anopheles albimanus* would be excellent vectors in favourable conditions. *Culex nigripes*, *Aëdes aegypti* and *Aëdes triseriatus* could convey the infection, but their low infectivity rates in this experiment suggest that they could not be important vectors. *Aëdes sollicitans*, *Aëdes taeniorhynchus*, *Aëdes vexans* and *Anopheles punctipennis* could not, apparently, transmit the infection. The results with *Anopheles quadrimaculatus*, *Culex erraticus*, *Culex salinarius*, *Psorophora ciliata* and *Psorophora discolor* were inconclusive.

The potential infectivity rate of *Psorophora confinnis* of the United States was 80 per cent. while in the apparently identical mosquito of Porto Rico it was only 12 per cent., 104 mosquitoes of each race having been dissected ; the two types of strains of this species were apparently physiologically different.

*J. F. Corson.*

NEWTON, W. L. & PRATT, I. **Experiments to determine whether Infective Larvae of *Wuchereria bancrofti* can migrate from the Abdomen of the Mosquito Intermediate Host.** *J. Parasitology.* 1945, Aug., v. 31, No. 4, 266–8.

The mosquito's legs and wings were removed, then a longitudinal incision was made along the lateral abdominal wall and a drop of saline containing from 1 to 7 infective larvae of *Wuchereria bancrofti* was placed on the incision ; the larvae entered the abdomen and the incision became closed within a few minutes. After about an hour the mosquito was divided into abdomen, thorax, head and proboscis, and these parts were examined for the presence of larvae.

Migration was found to have taken place in 22 of 27 mosquitoes ; of 68 active larvae recovered, 32 were in the thorax, 12 in the head or proboscis, and 24 in the abdomen. The time of migration varied greatly ; in one case a larva had reached the proboscis within 5 minutes, while in another case it took 105 minutes.

The authors conclude that " infective larvae occurring anywhere in the body of the mosquito are potentially capable of transmitting infection to man."

*J. F. Corson.*

MICHAEL, P. **Filariasis : Histopathologic Study.** *U.S. Nav. Med. Bull.* 1945, Aug., v. 45, No. 2, 225–36, 9 figs. (8 coloured).

The fact of several men of the Marine and Naval staffs stationed in the South Pacific coming under the author's observation on account of general malaise, fever, nausea, headache and painful red and swollen areas in the extremities, clearing up spontaneously after some days and recurring weeks or months later, has led the author to study the early histological changes in infestation by *Wuchereria bancrofti*. These he divides into those of an allergic type and those due to presence of the worm *in situ*. The former are associated with fugitive and tender, painful swellings (somewhat like erythema multiforme), especially on the arms, and the lymph-nodes may enlarge in the neck, axilla, groin, etc.—" a selective lymph node sensitivity to worm or worm products located elsewhere in the body." These are transitory, and biopsy shows changes similar to those found in response to tests with *Dirofilaria immitis* antigen; neither microfilariae nor worm segments are found in the tissue, but oedema and vascular stasis with local eosinophilia.

As regards reactions to the presence of the parasite, the lymphatic endothelium becomes stratified and the lumen narrowed. If there is an isolated worm present, degenerative changes occur ; the wall of the channel is thickened and oedematous, with fibroblastic and eosinophilic infiltration and perilymphangitis.

If, however, the worms are not isolated but together, and gravidity takes place, lymphangitis may appear with parturition and the liberation of microfilariae into the tissues. If, then, degeneration of the worm ensues, stratification and thickening of the endothelium are marked, granulation tissue proliferates and the worm itself becomes calcified ; a zone of necrotic tissue surrounds it and the site is invaded by fibroblasts, macrophages, endothelial cells and giant-cells. The lymphatics going to the nodes become varicose and collateral branches open up. In the nodes the first sign of parasitism is the development of " lakes of lymph . . . in the sinuses and lymph spaces " followed by massive production of polymorphonuclear and mononuclear eosinophile cells, and the lymph follicles become hyperplastic. The author sums up the situation by saying that " examination of the blood for microfilariae is inadequate for diagnostic purposes. The laboratory method of choice is biopsy of the suspected lesions." These lesions consist fundamentally of the tissue changes associated with all infectious granulomata *plus* those due to irritation from the presence of a foreign body. " Cellular reactions and edema give way to vascular hyperplasia, fibroblastic proliferation, increased amounts of reticulum in lymph nodes, caseation and eventual absorption of the parasite, and its replacement by a proliferative granulation tissue. This leads eventually to a decrease or disappearance of reticulum, and formation of hyalinized or even calcified scar tissue." The histological changes are well shown in a series of excellently reproduced plates in colour.

*H. Harold Scott.*

ZELIGS, M. A. **Psychosomatic Aspects of Filariasis. Present Day Evaluation.** *J. Amer. Med. Ass.* 1945, Aug. 18, v. 128, No. 16, 1139–42, 2 charts.

Early in 1943 the " Marine Barracks " at Klanmath Falls was established for the study of filariasis (and malaria) and for the rehabilitation of Marines who had returned to America suffering from these diseases. The men were not regarded as hospital patients and retained the benefits and privileges of men on active duty, although nearly 80 per cent. of them had been patients in various

naval hospitals and convalescent centres. The Marine Barracks had hospital wards and laboratories and the staff included medical specialists, laboratory research workers and technicians, nurses and corpsmen.

In many cases, partly owing to their previous sedentary or convalescent life, there was a good deal of hypochondriasis with psychosomatic reactions; in the course of time, however, and when the incurable psychoneurotics were removed, the general mental attitude of the men improved greatly. Two groups were compared: those with signs or a history of recent filariasis, and those who had returned to America 6 to 12 months previously and had been in hospital; the former returned to active duty more easily than the latter. Men who had recently been in battle and had the classic symptoms of war neurosis or combat fatigue paid less attention to their filarial symptoms than those who had been psychoneurotic before they became infected.

The following conclusions were reached: the disease soon dies out after removal of the patient from the endemic area; rehabilitation is best obtained by a combined programme of military, vocational, educational and medical training and supervision; no impairment of sexual function has resulted from filariasis and severe sequelae have occurred in only 0·2 per cent. of cases; in another year or so there should be no filariasis problem in the U.S.A.

*J. F. Corson.*

SAPHIR, W. **Filariasis: Early Clinical Manifestations. An Analysis of Thirty-Five Cases.** *J. Amer. Med. Ass.* 1945, Aug. 18, v. 128, No. 16, 1142–4.

The author studied 35 patients whose history and symptoms suggested that they were suffering from filariasis, although no microfilariae were found in the blood.

The commonest early symptom was a feeling of numbness or weakness in an arm or leg which was apt to "fall asleep," especially at night. Soon afterwards aching developed in one or more limbs, particularly after doing heavy work; this usually began in the axilla or groin and led the patient to discover his large and tender lymph glands in those parts. Later still the patient experienced periodically recurring pain in the axilla, arm, groin, thigh or scrotum, sometimes accompanied by swelling. These attacks lasted for varying periods, from a few hours to some days, and were followed by intervals of a few days or weeks with freedom from symptoms during the day, though nocturnal pain, especially in the testicle, was often present. Finally, the lymphatic glands became continuously palpable, though the degree of enlargement varied. This was the usual history during a month or two before admission to hospital; no history of any feeling of general illness was given.

The axillary, inguinal and femoral lymphatic glands on both sides were enlarged and tender in all the patients, and other lymphatic glands were also affected in some patients. Centrifugal lymphangitis was not seen. Left-sided funiculitis occurred in 21 cases and in six of these there was also left-sided varicocele; right-sided funiculitis was present in five. Ten had varicocele.

Lymph glands were excised in four cases; they showed hyperplasia but no filariae. Eosinophilia (5–10 per cent.) was present in nine patients and these had no intestinal worms.

The author thinks that the symptoms observed permitted a presumptive diagnosis of filariasis to be made.

*J. F. Corson.*

CULBERTSON, J. T., ROSE, H. M. & OLIVER-GONZALEZ, J. **Chemotherapy of Human Filariasis by the Administration of Neostibosan.** *Amer. J. Trop. Med.* 1945, May, v. 25, No. 3, 271–4.

Thirty patients were treated with neostibosan in Porto Rico. Five were adult males and twenty-five were girls between 8 and 17 years old. All had

microfilariae in the blood at night and all but one were free from clinical symptoms. The total dosage of neostibosan ranged from 4·6 to 10·5 gm. given intravenously in doses of 50 to 300 mgm. (on alternate days for three injections, and then six times a week) spread over 33–48 days. This dosage was well tolerated. At the end of treatment only two patients (whose night blood initially contained 3 and 9 microfilariae respectively per 60 cmm. blood) were free from these parasites. During the next six months, however, the microfilarial count declined steadily in most of the patients. After six months, seven patients had become negative, eight others showed a decrease in the number of microfilariae by at least 80 per cent., and in only one patient did no decline occur. Fifteen untreated young males were observed as controls. During the six months only one of these showed a decrease in the microfilarial count. [Although these results are of great scientific promise, they do not justify the treatment of filarial patients with neostibosan as a practical therapeutic measure at present.] *F. Hawking.*

LAWTON, A. H., BRADY, F. J., NESS, A. T. & HASKINS, W. T. **Tests of Mercury and Antimony Compounds in** *Dirofilaria immitis* **and** *Litomosoides carinii* **Infections.** *Amer. J. Trop. Med.* 1945, May, v. 25, No. 3, 263–9, 1 fig.

Tests were carried out on dogs infected with *D. immitis* and on cotton rats infected with *L. carinii*. Mercury cyanide and mercury oxycyanide had no apparent antifilarial action in dogs even when given in toxic doses. Antimony compounds of various types were given to dogs in various dose schedules. The one which was most satisfactory as regards therapeutic action and freedom from toxic effects was 0·8 mgm. of antimony per kgm. body weight, given intravenously each day. Presumably a certain threshold level of antimony must be maintained in the blood to kill the microfilariae. Of the different antimony compounds tried, sodium antimonyl 4-tertiary butyl catechol, sodium antimonyl d-arabitol, and p-phenetidine antimonyl tartrate were the most active, the blood being freed from microfilariae after 4–5 injections. However, live adult worms usually persisted for many weeks afterwards; the females usually showed degenerative changes in the uteri. Altogether, 29 dogs were used in these experiments and 28 were freed from microfilariae by means of antimony compounds.

A small number of cotton rats, infected with *L. carinii*, were treated by intramuscular or intraperitoneal injections of antimony compounds. Cotton rats tolerate larger doses than dogs. The response to treatment was less rapid or complete. In rats treated with five compounds, the adult worms were killed, but 10 per cent. of the microfilariae persisted in the blood until the rats were killed two months later. Four other compounds, which had proved effective against *D. immitis* in dogs were ineffective against *L. carinii* in rats. The acute toxicity of the compounds was tested by intraperitoneal injection into mice. The compound which had the most favourable ratio between therapeutic activity and toxicity was sodium antimonyl 4-tertiary butyl catechol. *F. Hawking.*

RIDLEY, H. **Ocular Onchocerciasis, including an Investigation in the Gold Coast.** *Brit. J. Ophthalm.* (*Monograph Suppl. X*). 1945, 58 pp., 27 figs. & 4 pls. (3 coloured). [156 refs.]

This monograph has been written by an ophthalmic surgeon who has recently served with the forces in West Africa. He there availed himself of an opportunity to investigate the eye lesions resultant on *Onchocerca volvulus* infestation of man in an area where these are known to occur. The author regards ocular

onchocerciasis as more terrible in its effects than the far more widespread trachoma. He deplores the lack of appreciation of its importance as a source of blindness throughout the major portion of the British Colonial Empire. It has been shown that filarial blinding is prevalent in certain limited areas of the Belgian Congo though the parasite is found extensively in this territory: in West Africa it is equally prevalent, but, until very recently, it has not been recognized to what extent blindness is here attributable to it. The tendency up to now has been to regard onchocercal blinding as an extreme rarity in West Africa, a view which Ridley does not share.

After briefly outlining the historical aspect of onchocerciasis, and delineating its geographical distribution, the author gives an account of the morphology, life-cycle and mode of transmission of *O. volvulus*: he mentions the various anatomical sites in man from which the adults and the microfilarial forms have been recovered. The view is expressed that effective intermediate hosts other than *Simulium* spp. may exist [though no evidence is given for this belief], and the author is concerned about the possibility of extension of the range of the parasite beyond its present geographical confines as a result of troop movements into and out of the various endemic areas.

The clinical manifestations of the disease, and its diagnosis, are covered: and the author goes with considerable detail into the eye changes he encountered in over 300 natives examined for onchocerciasis at Funsi in the Northern territory of the Gold Coast. Of these cases, 131 had onchocercal nodules, and five others were found to be suffering from ocular onchocerciasis, but had no discoverable nodules. Of these 136 cases of onchocerciasis, among the 300 persons examined for the disease, 51 had ocular manifestations. Visual defect ranged from blindness or near-blindness in 22 persons, through varying degrees of visual defect to good sight in 20 of the 51. The author points out that the proportion of eye defects in his series may be misleading, as he saw, possibly, a selected portion of the population in view of the known aims of his visit.

The examinations were made under difficulties in the bush, but a microscope and some ophthalmic equipment, including a slit-lamp, were available. To the author's regret he was not permitted, owing to native prejudice, to excise a blinded eye for subsequent thorough pathological examination. His detailed account of the ocular pathology of onchocerciasis is therefore largely based on the literature. But, from this and from his own slit-lamp observations, he states that there is now no doubt that all onchocercal ocular lesions are caused by toxins released locally by dead microfilariae, and that the living microfilariae set up no tissue reaction.

The author's observations on his 51 Funsi cases are recorded in tabular form, and fuller clinical and pathological details are given of the 22 cases with gross visual impairment. In addition to the cases at Funsi, the author found 16 African soldiers and four African civilians in Accra to be suffering from ocular onchocerciasis. Some of these men came from reputedly non-endemic areas. In describing the differential diagnosis of onchocerciasis, the suggestion is made that the keratitis, iritis and choroido-retinitis attributed to trypanosomiasis may in fact be due to a concurrent onchocerciasis and not to the trypanosomal infection. Ridley states that personal examination revealed no ocular complications other than mild papilloedema in just over 100 cases of trypanosomiasis in the absence of an onchocercal infection.

The opinion is expressed that there is no effective treatment of onchocerciasis; and that even removal of the nodules is of limited value, as the individual microfilariae can survive for long periods (in one quoted case for at least 8 months) after excision of all known nodules. The author points out the difficulties in the prevention of the disease, and concludes by reiterating

its gravity. There is a comprehensive bibliography appended, and there are good microphotographs and photographs in the text. *A. R. D. Adams.*

GETZ, L. **Massive Infection with *Trichuris trichiura* in Children. Report of Four Cases, with Autopsy.** *Amer. J. Dis. Children.* 1945, July, v. 70, No. 1, 19–24, 1 fig. [Refs. in footnotes.]

Routine examination of stools reveals a high incidence of *Trichuris trichiura* in Panama [presumably in children especially]. Exact statistics are, however, not available. The author quotes the study of 160 cases of infection of children with multiple intestinal parasites by EINHORN, MILLER and WHITTIER (this *Bulletin*, 1945, v. 42, 911) and a clinical survey of trichuriasis in children to be published in the same journal by the same authors.

Getz analysed 1,307 autopsies which he did between 1924 and 1929. Among these subjects 374 (28·6 per cent.) harboured " worms " and, among these 374, *Trichuris* occurred either alone or together with other intestinal parasites in 100 (7·6 per cent.). The maximum number of " parasites " found in any one subject was 400 and the heaviest infestations occurred in children. The author gives a valuable survey of the literature about trichuriasis and concludes that *Trichuris* may cause serious symptoms and physical signs, especially when infestations with it are massive, as they may be in young children in Panama. The four subjects described in this paper support this view.

The first subject was a mestizo girl, aged 13 years, weighing only 52 lb. She had been passing four to eight watery stools daily ; the parents had not detected blood in them. She had suffered from weakness and loss of weight for three months. She was acutely ill and emaciated, with a temperature of 101·4°F. There was a marked pallor of the mucosa of the lips, the conjunctiva was bluish-white and the palms and soles were waxen yellow. The heart, liver and spleen were enlarged. Examination of the blood revealed a haemoglobin value of 30 per cent. (Sahli), 2,300,000 erythrocytes per cmm. and 3 per cent. of eosinophils, but no malaria. Examination of the stools revealed *Entamoeba histolytica* and eggs of *Trichuris trichiura*, *Ascaris lumbricoides*, hookworm, and larvae of *Strongyloides stercoralis*. The patient was treated with emetine hydrochloride for three successive days and then with oil of chenopodium, but died on the fifth day. Autopsy confirmed the points mentioned above. In the small intestine there were a few *Trichuris* and six " uncinarias ". From the caecum downwards throughout the whole large intestine and including the appendix there were more than 1,100 specimens of *Trichuris* and a number of others were lost. The mucosa of the large intestine and caecum was injected and covered with mucus in which *E. histolytica* was found. There was dilatation of the heart, pulmonary oedema, fatty liver and secondary anaemia.

The second subject was a mestizo boy, aged four years, weighing 24 lb. He had had bloody diarrhoea, fever and cough for three days. He also was acutely ill, showing signs and symptoms essentially similar to those shown by the first subject. The rectal mucosa was prolapsed and several specimens of *Trichuris* were seen moving about on the prolapsed tissue. This is not uncommon in Panama children. Examination of the blood of this subject revealed a haemoglobin value of 30 per cent. (Sahli), 2,300,000 erythrocytes per cmm. and 4 per cent. of eosinophils, but no malaria parasites. In the stools the eggs of *T. trichiura* and *Ascaris lumbricoides* were found. The boy died 23 hours after admission to hospital. Autopsy revealed near the ileo-caecal valve one *A. lumbricoides* and a number of *T. trichiura*. In the caecum and ascending colon there were eight masses of *T. trichiura*, numbering more than 1,700 altogether. No amoebae were found. There were small ulcers in the lower sigmoid and rectum. There was dilatation of the heart, enteritis, colitis, secondary anaemia and emaciation.

The third subject was a mestizo girl, aged 7 years, weighing 24 lb. She had had diarrhoea for six weeks, with fever and swelling of the face for five days. She was emaciated and could not stand. She showed the same external evidences of secondary anaemia as the two previous subjects, and in addition oedema of the face, hands, abdomen and lower extremities. Examination of the blood revealed a haemoglobin value of 30 per cent. (Sahli), 2,400,000 erythrocytes per cmm., 3 per cent. of eosinophils, but no malaria parasites. The Kahn and tuberculin tests were negative. The stools contained eggs of *T. trichiura, Necator americanus, Ascaris lumbricoides* but no *Entamoeba histolytica.* Blood transfusions and a course of hexylresorcinol failed to prevent her death 19 days after admission to hospital. Autopsy revealed 140 " uncinarias " in the small intestine ; between the caecum and the anus 4,100 *T. trichiura* were counted. Some of these were in six or eight masses ; they also occurred in the appendix. There was secondary anaemia, acute cardiac dilatation, pulmonary oedema and fatty changes in the liver and myocardium.

The fourth subject was a mestizo girl, aged 7 years, weighing 40 lb. She had had shortness of breath, swelling of the face and hands and dark red urine. She was emaciated and sunk in deep coma, with a temperature of 101°F. She had oedema of the face, hands, abdomen and lower extremities. Examination of the blood revealed a haemoglobin value of 30 per cent. (Sahli), 2,300,000 erythrocytes per cmm., 4 per cent. of eosinophils, but no malaria parasites. The Kahn test was negative. The stools contained eggs of *T. trichiura,* but no *E. histolytica.* The patient died in 30 hours. Autopsy revealed that the primary cause of death was acute haemorrhagic nephritis. It also revealed pericardial effusion, a dilated heart and about 250 cc. of fluid in the peritoneal cavity. In the large intestine more than 400 specimens of *T. trichiura* were counted, but there was no ulceration. Like the other three, she had secondary anaemia. The author concluded that although the first patient harboured five species of parasite, the infestations with *Strongyloides* and *Ascaris* were mild, because they were not found at autopsy after five days in hospital. The *Necator* infestation in this patient was also probably mild. *E. histolytica* may have been important, but the *Trichuris* infestation was the predominant feature. In the third the *Necator* infestation may have been a contributory cause of death. In the second the *Ascaris* infestation was not significant. In the fourth the haemorrhagic nephritis was the primary cause of death, but this subject was the only one of the four who harboured *Trichuris* only and this must have debilitated the child. The first three illustrate well the view expressed by CRAIG and FAUST (*Clinical Parasitology,* 3rd edn. 1943, p. 241) that clinically, heavy infestations with *Trichuris* may suggest severe hookworm disease. The most important signs of severe *Trichuris* infestation are diarrhoea, blood-streaked stools, weakness and loss of weight, with pallor, fever, emaciation, anaemia and abdominal distension. The autopsies showed that the Trichurids may invade the whole length of the large intestine, but that there may be no characteristic lesions. Getz has examined subjects with the proctoscope and has found that the whole wall of the lower part of the descending colon and of the sigmoid may be covered with an almost continuous film of living, moving trichurids. Infestation with *Trichuris* is, however, usually considered to produce only mild clinical effects (the author refers, for example, to FERNÁN-NÚÑEZ, this *Bulletin,* 1927, v. 24, 1002). These four subjects show that its effects can be severe, and in his survey of the literature, the author refers to other instances. It seems certain that the prolonged diarrhoea and anaemia may result in cardiac failure and death, but we still do not know how *Trichuris* causes anaemia.

*G. Lapage.*

## DEFICIENCY DISEASES.

GILLMAN, T. & GILLMAN, J. **Powdered Stomach in Treatment of Fatty Liver and other Manifestations of Infantile Pellagra: its Significance with reference to the Problems of Edema and Steatorrhea in Infants and in Adults.** *Arch. Intern. Med.* 1945, Aug., v. 76, No. 2, 63–74. [Refs. in footnotes.]

In this paper the authors amplify their views as to the aetiology and pathology of infantile pellagra in Africans seen in Johannesburg, and record the continuing success of treatment with a preparation of powdered stomach. In previous papers [this *Bulletin*, 1944, v. 41, 1057; 1945, v. 42, 748] they reported rapid cure in each of six cases treated in this way, together with administration of a good diet; they now record three more patients in whom the same satisfactory result was achieved, and they again mention the cases previously treated with vitamins or with liver preparations, in whom the results were poor, most of the patients dying. The chief clinical findings in these children were: dermatitis (sometimes with exfoliation and ulceration), a smooth, atrophic tongue, cheilosis, oedema of various degrees, enlargement of the liver (due to accumulation of fat in the liver cells), microcytic anaemia, reduction in serum protein, especially albumin (but the oedema is not related to this), and the passage of bulky, offensive stools containing a high proportion of fat.

As a result of their observations, the authors conclude that the liver, kidney and stomach are closely interrelated in the control of water metabolism; one of the striking features of treatment with powdered stomach was the dramatic disappearance of the oedema. Another effect was the disappearance of the steatorrhoea. The cause of steatorrhoea in coeliac disease and sprue is not well understood, but the suggestion is made that in infantile pellagra there is first a dietary deficiency and vitamin imbalance which leads to disturbance of fat metabolism, that the continuous presence of fat in the alimentary tract leads to the formation of enterogastrone, a hormone which inhibits gastric activity by suppression of the formation either of the intrinsic factor or of hydrochloric acid. "Prolonged inhibition, as in chronic sprue, may eventually result in complete suppression of all the functional activities of the stomach." The thesis is advanced that though in the first place the dietary deficiency is responsible for initiating the changes of infantile pellagra, they lead to secondary changes, and that where these occur, treatment by administration of vitamins is no longer capable of restoring the normal condition. Treatment with dried stomach corrects these secondary effects. "A disease at a certain stage loses its connection with the initial cause. The subsequent course of the disease may then be determined by the secondary pathologic changes."

The dose of powdered stomach was 10 gm. daily for five days.

[These findings are evidently of great importance in saving life. It may, perhaps, be permissible to emphasize the fact that this syndrome, which reflects the bad state of nourishment of these unfortunate people, is preventable by action to ensure an adequate diet.] *Charles Wilcocks.*

MEYERSBURG, H. A. **Senile Psychosis and Pellagra. A Report of Two Cases.** *New England J. of Med.* 1945, Aug. 9, v. 233, No. 6, 173–6. [28 refs.]

"Senile psychosis may be simulated by pellagrous encephalopathy in the aged. The underlying neurologic alterations in the elderly patient may predispose to this occurrence.

"The senile-pellagrous type of encephalopathy may respond well to treatment with crystalline vitamin B products or with natural vitamin B concentrates. The recognition of this group of cases may permit effective therapy.

" The maintenance of an optimal dietary by the normal aged person as well as by the senile invalid should be a matter of primary importance."

SPIES, T. D., PERRY, D. J., COGSWELL, R. C. & FROMMEYER, W. B. **Ocular Disturbances in Riboflavin Deficiency.** *J. Lab. & Clin. Med.* 1945, Sept., v. 30, No. 9, 751-65, 6 figs. & 4 coloured figs. on 1 pl. [20 refs.]

From among patients attending the Nutrition Clinic of the Hillman Hospital, 500 were arbitrarily selected for treatment ; of these, 300 treated by at least one intravenous injection of riboflavin form the subject of this article. They were all persons who had developed ocular disease after subsisting on diets judged to be deficient in riboflavin, were aged between 8 and 92 years, male and female, both white and negro. The majority were selected as having no organic disease, no clinical evidence of co-existing deficiency disease, and no known disease of the alimentary tract.

The subjects were for the most part treated as out-patients and were observed before, during and after treatment. In many cases slit-lamp examinations were made ; bacteriological investigations were carried out in 50 cases ; riboflavin blood levels determined in 50, and urinary levels in 50, by the microbiological method. Dietary studies were made from data supplied by the patients and these, in general, suggested a 64 per cent. deficiency of riboflavin intake. The common complaints were : nervousness, insomnia, headache, burning and aching of the legs and feet, burning and cramping of the stomach, constipation, burning of the skin, itching and burning of the eyes and failing vision, symptoms which waxed and waned in intensity ; 154 had cheilosis [angular stomatitis] at some time, on one side only in 15, but none had the abnormal redness of the lips [cheilosis] ; in 2 the tongue was magenta red ; in 12 the naso-labial folds were affected.

Conjunctivitis, both bulbar and palpebral, was sometimes the sole manifestation. In all 300 " it was observed that small vessels encroached on the cornea at the scleral corneal junction [not further defined]. Circumcorneal injection was grossly visible in 80 per cent. ; interstitial [*sic*] keratitis was present in 60 per cent. and corneal ulceration in 53 per cent. ; pterygia was noted in 50 per cent.

The case notes of three subjects are given at length.

[This article contains nothing essentially new ; its chief value lies perhaps in the fact that the authors have come to recognize, as others have done, how great is the uncertainty concerning riboflavin and deficiency disease. They say—" We freely admit that we do not know what specific ocular symptoms and lesions are caused by riboflavin deficiency." After stating that " It is only by determining the effect of riboflavin therapy on the ocular manifestations that a diagnosis of riboflavin deficiency can be made," the authors add—" that this method of diagnosis and treatment is unsatisfactory we know." In regard to the symptoms described, they say—" It is to be admitted freely that the picture described is not one which is pathognomonic of riboflavin deficiency or one that can be immediately and specifically differentiated from superficial inflammation of the eye from numerous other causes." Again " this therapeutic test may in itself not be thoroughly valid because we have gained an impression that most inflammatory disorders of the superficial portions of the eye may be benefited to some degree by an excess of riboflavin to the organism." " All our studies on the riboflavin content of the blood tend to indicate that there is little or no fall in the concentration of riboflavin even in the presence of severe lesions." In fact, anyone about to write upon

the subject would do well to remember the authors' final conclusion—"we must admit, at this time, riboflavin deficiency is little understood."]

*H. S. Stannus.*

FEHILY, Lydia. **Nutritional Deficiencies in Hong Kong before the Japanese Invasion.** *Brit. Med. J.* 1945, Oct. 6, 468–70.

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## HAEMATOLOGY.

PONDER, E. **The Sickling Phenomenon and its Bearing on the Problem of Red Cell Structure.** *J. Exper. Biol.* 1945, Aug., v. 21, Nos. 3 & 4, 77–83, 1 fig. [30 refs.]

For the purpose of description the author calls an erythrocyte which appears normal but which, under suitable conditions, becomes a sickle cell, a promeniscocyte. In vaseline-sealed cover glass preparation the plasticity of the promeniscocyte becomes increased after a period of time which varies with the thickness of the preparation, the temperature and other factors. The rim of the cell becomes progressively thinner on one side until, usually within one to two minutes, continuity breaks down. The crescent so formed then opens out rapidly, within about a second, and the thin stretched concave edge expands into a series of veil-like projections. At the same time the total length of the crescent contracts, but the mean cell thickness increases and the volume does not change. After some hours or days the cell rounds up, becomes a prolytic sphere and is haemolysed. As the crescent opens up, one or more slender filaments arise from each point, 10$\mu$ or more in length, and shorter filaments may extend outwards from the scalloped concave edge of the crescent. If the sickle cell is retransformed into the discoid form, the long filaments break off at their bases and contract into rods or globules which can be seen floating freely in the plasma. Sometimes the rim of the promeniscocyte thins irregularly, giving rise to very bizarre forms of cell.

Oxygenation of a sickle cell results in lengthening of the crescent with increase of its curvature, while at the same time the concave border extends further and becomes smoother, until finally the points of the arc meet and the discoid form is re-established. At the junction of the points of the arc a small globule is formed and occasionally the filaments remain tangentially attached to the cell at this point for some time. Reversal of a sickle cell to discoidal form under suitable conditions usually takes some minutes. A cell sickling for the second time does not necessarily break at the region of the previous junction.

Sickle cells undergo no sudden changes of shape on the addition of rose bengal, lecithin or saponin. They remain as sickles until the time of lysis, when they turn into spheres or fade from view, unlike normal cells which, before haemolysis, become spherocytic under the action of the first two agents and crenated by the last. The ghosts of sickle cells so obtained are, however, never sickle-shaped but always irregularly spherical, while ghosts obtained by lysing sickle cells with water are discoidal, in conformity with the rule that mammalian water ghosts are biconcave discs, although they often show considerable crenation. Exposure of meniscocytic ghosts to low oxygen tension does not result in any change in shape of the sickling type, since the presence of haemoglobin in the cell is necessary for the transformation from discoid to sickle shape.

The shape of erythrocytes is probably determined by a balance of forces. The force of surface tension tends to produce a spherical form, while, it is suggested, the forces which maintain the cell as a biconcave disc are repulsions

between the side chains of radially arranged cephalin molecules. To account for the sickle cell process it is necessary to suppose that the haemoglobin in the cell exerts an "expansive force," a function of the oxygen tension. In the normal cell this force produces only tension, but in the promeniscocyte, owing to some defect in the ultrastructure [presumably the molecular structure] of the envelope, it produces sickling. It is suggested that the inability of the ghost cell to form spheres is due to the disappearance of the forces associated with the haemoglobin, while the forces of surface tension become equal both inside and outside the ultrastructure. Leptoscopic measurements have shown the normal red cell envelope thicker by some 30 to 50 A in the region of the biconcavities than elsewhere, and that this difference is increased by organic solvents. The question now arises whether haemoglobin is distributed uniformly throughout the cell, either as a highly viscous solution or as a gel, for it becomes absent from the veil-like material of the sickle cell, a material which corresponds to that of the biconcavity of the normal disk. It may be that during sickling the surfaces of the ultrastructure in the region of the biconcavity come into apposition and so drive the pigment into the body of the meniscocyte; this explanation retains the idea that the haemoglobin is in solution. An alternative type of explanation is that the pigment is not in solution, but is combined or imbedded in a cytoplasmic matrix and that it leaves the region of the biconcavity by a process similar to that of protoplasmic streaming. *F. Murgatroyd.*

DEGAZON, D. W. **Neurological Complications in Tropical Macrocytic Anaemia.** [Memoranda.] *Brit. Med. J.* 1945, Oct. 6, 461.

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## DERMATOLOGY AND FUNGUS DISEASES.

FONZARI, M. Algumas causas desencadeantes do pênfigo foliáceo. [**Causes precipitating (the Onset of)** *Pemphigus foliaceus.*] *Brasil-Medico.* 1945, July 21 & 28, v. 59, Nos. 29/30, 261–4, 4 figs. English summary.

Some authorities regard *Pemphigus foliaceus* as an allergic manifestation, or, as the author calls it, pathergic, by which term we are to understand that some agent as it were pulls the trigger and sets the disease going. Such a precipitating agent may be a streptococcus or a mosquito-bite, for example. The history of one case was as follows: A man of 23, working as a woodcutter, complained of difficulty in swallowing for 10 days or so; he was then bitten by a mosquito on an eyelid; a bulla formed, followed by others in various parts of the body. Acute pemphigus ensued and death occurred five days after his admission to hospital. Another referred the onset of his attack to being bitten by ticks while he was working in a wood; this resulted first in itching and burning and later in bullous formations and pemphigus. In yet another case the origin of the disease was definitely associated by the patient with his having scalded his foot and hand with some fat, some three months before. Bullae broke out, burst and healed with scarring. Then other bullae appeared in other parts of his body, which ulcerated and a condition of pemphigus set in and death took place soon after his admission to hospital.

The author accounts for the failure of sulphonamides and penicillin to cure—and he quotes half a dozen cases in which penicillin was administered in doses ranging from 100,000 to over a million units—by saying that, though the secondary or concomitant infection might be overcome, the pemphigus continued on its way unchecked. *H. Harold Scott.*

BIANCHI, A. E. Micetomas podales por actinomices y por micotorulas. [**Mycetoma of the Foot.**] *Rev. Asoc. Med. Argentina.* 1945, June 30, v. 59, No. 560, 700–704, 5 figs.

A report of two cases and a discussion of the classification of fungi in relation to human disease.

BUTT, E. M. & HOFFMAN, A. M. **Healed or Arrested Pulmonary Coccidioidomycosis. Correlation of Coccidioidin Skin Tests with Autopsy Findings.** *Amer. J. Path.* 1945, May, v. 21, No. 3, 485–505, 12 figs. on 5 pls. [10 refs.]

The correlation of the coccidioidin dermal reaction with coccidioidomycosis and calcified pulmonary nodules has been discussed by many writers, and this literature is summarized in a paper by COX and SMITH (*Arch. Pathology*, 1939, v. 27, 717–34).

The present work deals with the post-mortem pathological study of patients on whom the coccidioidin test had been made. The Santa Fé Coast Lines Hospital, in which the study was made, receives patients from a wide area, which includes most of the known endemic areas of coccidioidomycosis. As the patients are members of the Hospital Association they return regularly and may be kept under observation for a long time (in some cases for 25 to 30 years), and, eventually, an autopsy may be obtained. Of 1,165 patients tested with coccidioidin, 302 (25·9 per cent.) gave positive reactions. The incidence of positive reactors amongst patients from the major endemic areas was: from the San Joaquin Valley 62·8 per cent., Arizona 28·0 per cent., and Texas 35·7 per cent.

Autopsy was made on 36 patients, of whom 11 had been reactors to coccidioidin. Nearly all of these 11 showed pulmonary calcareous or fibrous nodules, and parasitic spherules were found in the healed lesions of eight, but in only five could the spherules be identified with certainty as *Coccidioides immitis*. In none of these positive reactors was a clear clinical history suggestive of coccidioidal disease obtained. Of the 25 patients negative to coccidioidin, all but four had calcified nodules in the lung, but in only one of these were (very dubious) spherules found.

The calcified lesions of coccidioidomycosis are indistinguishable, grossly, from similar lesions of tuberculosis except that apical scars are not found in uncomplicated, healed or arrested pulmonary coccidioidal disease. Inoculation of material from some of the cases into guineapigs, and attempts at culture, suggest that most of the lesions are mycologically and bacteriologically sterile.

As with the tuberculin test and tuberculosis, there seems to be a rough quantitative relationship between the coccidioidin skin reaction and the activity or age of the primary coccidioidal lesions. The coccidioidin reaction may be negative in advanced and progressive coccidioidomycosis and it is probable that it may become negative in some patients with healed lesions. There is apparently no cross-allergenic relationship of tuberculin and coccidioidin, and no cross-relationship between the coccidioidin test and similar tests with the allergens of *Blastomyces*, *Aspergillus* or *Sporotrichum*. *J. T. Duncan.*

MOSTO, D. & IARICCI, V. Presentación de un caso de granuloma por "Paracoccidioides brasiliensis." [**Description of a Case of Granuloma caused by** *Paracoccidioides brasiliensis.*] *Rev. Asoc. Med. Argentina.* 1945, July 30, v. 59, No. 562, 826–30, 11 figs.

Paracoccidioidal granuloma was formerly mistaken for the coccidioidal granuloma of Posadas-Wernicke, but DE ALMEIDA in 1930 showed that the parasitic spherules of the causative fungus differed from those of *Coccidioides*

*immitis* in having no internal spores, but, instead, an external surrounding zone of small spore-like reproductive bodies. The fungus was therefore placed in a new genus *Paracoccidioides* Almeida 1930, as *Paracoccidioides brasiliensis* (Splendore) Almeida 1930. The disease, called paracoccidioidal granuloma, is regarded as clinically more closely related to Gilchrist's disease or North American blastomycosis than to coccidioidomycosis. The authors describe four cases of paracoccidioidal granuloma in Argentina, three of which had been published previously; in two of these three there was extensive involvement of the lungs, with cavitation in one case, and in both there were ulcerating granulomatous lesions in the mouth; in the third case there was extensive disease simulating carcinoma of the head of the pancreas, extending to adjacent abdominal viscera. In all cases there was localized adenopathy with caseation and suppuration in some of the glands. The diagnosis was based on histological examination of tissue obtained by biopsy, which showed the characteristic granuloma composed of great numbers of multinucleated giant cells and histiocytes containing the parasite (a thick-walled spherical body varying in size from 1 to 30$\mu$, surrounded by a zone of small bud-like bodies), plasma cells, lymphocytes and eosinophiles. Suppuration was associated with a "fibrino-leucocytic exudation" which, the authors believe, is provoked by a secondary bacterial invasion. In one case the diagnosis was confirmed by inoculating the sputum into the testis of a guineapig, with reproduction of the disease, and in the other two by post-mortem examination. Tuberculosis was excluded in all cases. In the fourth case, hitherto unpublished, the lungs were involved and there were associated granulomatous, ulcerating lesions in the mouth, with adenopathy of related lymphatic glands. The ulcers in the mouth were covered with a whitish exudate suggesting leucoplakia and were painful, and bled on contact. The patient suffered from loss of weight and anorexia with a febrile condition increasing with the progress of the disease.

Paracoccidioidal granuloma has only recently been found in Argentina and involvement of the lungs is believed to be comparatively rare, occurring in only about 15 per cent. of the cases as compared with 95 per cent. in coccidioidal granuloma. *J. T. Duncan.*

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## HEAT STROKE AND ALLIED CONDITIONS.

PARK, R. G. **Disorders due to Heat.** *New Zealand Med. J.* 1945, June, v. 44, No. 241, 128–31.

One of the objects of this paper, says the author, is to pass on some practical points learnt in four years of tropical military medicine. He first discusses hyperpyrexia, when he emphasizes that the primary disorder is a failure of the sweat glands. In the dry heat of North Africa little hyperpyrexia was seen [but in the hotter Arabian desert WATERLOW, HUDSON and LADELL did encounter such cases). Hyperpyrexia must not be confused with cerebral malaria. After excessive sweating there may be a heat exhaustion; there is here peripheral circulatory failure and the general picture of shock. The author outlines the nervous and humoral control of the sweat glands, and the effect of drugs upon sweating; he then describes the clinical effects of hyperidrosis, of which the most important is heat cramp, their diagnosis and treatment. [There is some confusion in this paper between pathological hyperidrosis and the high sweat rates that occur naturally in extreme heat; for the former, the author recommends X-rays, sympathectomy, or belladonna.

Administration of water and salt is advised as treatment of the effects of excessive sweating; but the importance of water and salt as a prophylactic against these effects is not emphasized.]

For prickly heat a calamine lotion is recommended. Hot climates aggravate "sweaty feet," but infection is equally important, and the condition may be constitutional. Some relief may be obtained by avoiding heavy boots or rubber shoes. Skin hardeners such as spirit or formalin prevent maceration and infection; a powder containing salicylic acid should be used after drying the feet. A cream containing hexamine which when wetted with sweat from the feet released formalin, is useful in mild cases. The relief given by X-rays is usually only transient. *W. S. S. Ladell.*

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## MISCELLANEOUS DISEASES.

PAVLOVSKY, E. N. **Natural Focal Localization of Human Transmissible Diseases and the Concept of Landscape as an Epidemiological Factor.** *Med. Parasit. & Parasitic Dis.* Moscow. 1944, v. 13, No. 6, 29–38. [In Russian.]

In the course of numerous parasitological surveys throughout the Soviet Union, by expeditions led or organized by the author, observations were made on certain peculiarities in the distribution of some transmissible diseases, which are of epidemiological importance. Some of these diseases manifest a natural focal localization within well-defined geographical areas (biotopes), where the pathogenic organisms, their vectors and hosts form an ecological association (biocoenosis), enabling the infection to circulate for indefinite periods of time from donor-host *via* vector to recipient-host. One of the characteristics of such a focus of infection is its complete independence of man (and domestic animals). However, human beings temporarily entering such a locality expose themselves to bites of the vector and may become infected. Furthermore, if man settles down to live in a zone where such foci exist, one of the following relations will be established between him and the focus: (*a*) The focus might prevail over man, giving rise to outbreaks of the disease; (*b*) the economic activities of man might bring about the extinction of the focus; or (*c*) the focus might continue to exist in proximity to, but not in contact with, man, with the result that it remains potentially dangerous.

This type of focal localization has already been discovered for a number of diseases. Thus, in the desert areas of Central Asia, oriental sore occurs naturally among gerbils which share their burrows with the sandfly-vector. This disease is a typical zoonosis, being transmissible to human beings when these come into contact with sandflies infected from the rodents which represent the reservoir-host [see this *Bulletin*, 1944, v. 41, 331]. Similarly, the foci of spring-summer encephalitis are found in uninhabited forest areas of eastern Asia, where the infection is maintained in various wild animals and in the tick-vector. When bitten by ticks, human beings become infected, the result of the infection differing according to the dose of virus received: if this was large, the infection develops all the symptoms of encephalitis; if it was small active immunity is acquired. Focal localization also occurs in various tick-borne typhus fevers (tsutsugamushi; Rocky Mountain fever, and similar diseases in the Soviet Union). One of the expeditions led by the author discovered in the steppe zone of the Krasnoyarsk territory (Siberia) natural foci of typhus fever affecting wild rodents (marmots, field mice and hamsters) and transmitted by ticks (*Dermacentor nuttalli*). Like other zoonoses, this disease

is maintained independently of man, who becomes infected accidentally, when attacked by the vector. Among other diseases with a natural focal localization, independent of the human host, the author mentions plague, tick-borne relapsing fever, tularaemia, Japanese encephalitis, yellow fever, brucellosis, rabies ; probably kala-azar and sandfly fever, and possibly also various typhus fevers (both louse- and tick-borne).

The natural foci of transmissible diseases can remain undetected and dormant for indefinite periods of time, as long as human beings do not come into contact with them ; they therefore constitute a potential epidemiological danger, and it is important that their existence should be recognized beforehand. Since such foci are characterized by definite geographical peculiarities which can serve as indicators of the presence of certain diseases in such areas, a knowledge of what is termed " the landscape epidemiology " is useful in determining the potential danger of places about to be occupied by man. Thus the " tundra " zone of Siberia is the habitat of numerous blood-sucking Diptera and may harbour foci of tularaemia. The forests (" taiga ") of the Far-East represent the endemic zone of tick-borne encephalitis, while tick-borne typhus fever occurs in the region of wooded plains of Siberia. On the other hand, the desert regions of Middle Asia contain the typical biotopes of oriental sore and tick-borne relapsing fever. *C. A. Hoare.*

HODES, P. J. & WOOD, F. C. **Eosinophilic Lung (Tropical Eosinophilia).** *Amer. J. Med. Sci.* 1945, Sept., v. 210, No. 3, 288–95, 2 figs.

A helpful contribution in attempting to contrast fundamental differences between eosinophilic lung and Loeffler's syndrome. The authors give a brief sketch of the literature on the subject of eosinophilic lung and then describe two cases observed by themselves : one an Anglo-Indian from Calcutta, the other an Indian from Madras. Both had a little fever, to 102° in the former, to 101°F. in the latter, with leucocytosis 21,000 and 40,000 per cmm. respectively and eosinophiles 38 and 65 per cent., " soft " mottled patches in the lungs and disappearance of symptoms on treatment with neoarsphenamine.

The differences between this and Loeffler's syndrome are given as absence of asthmatic attacks, more developed nodules seen in X-ray pictures, less degree of leucocytosis, transiency of lung conditions, more seasonal (especially prevailing in the summer months) and occurring in temperate climates as well as in the tropics and subtropics, all being characteristics of Loeffler's syndrome. *H. Harold Scott.*

LEE, R. K. C. & PANG, H. Q. **Ichthyotoxism—Fish Poisoning. A Report and a Review.** *Amer. J. Trop. Med.* 1945, May, v. 25, No. 3, 281–5.

Of the two forms of fish-poisoning, that by toxins present in the living fish and that inserted by wounds inflicted by the spines, the present article deals with the former. Two outbreaks occurred in Honolulu in the last two months of 1944, the persons attacked numbering 34 and 14 respectively, and all showed symptoms a few hours after ingestion of sea bass, *Variola louti* and *Serranus fascoguttatus*. The fish appeared to be quite fresh. Animals to whom some of the fish was given were also poisoned.

The symptoms in the human cases were much the same in all. They might set in within a couple of hours, or be delayed for 6–7 hours. They started with diarrhoea and some abdominal pain (not severe) ; the stools were liquid, light in colour at first, and frequent, every 10-15 minutes ; an hour or two later there would ensue a numb sensation in the lips and mouth, with aching of limbs, perhaps severe enough to need an opiate. At the same time there

was a burning sensation in the mouth making swallowing difficult and a feeling described as a " dry ice sensation " of the palms and soles ; 48 hours later there was itching of the hands and feet, but no rash. The patients were sufficiently recovered to be able to get about in 10 days or so, but on leaving hospital, the paraesthesia or itching was still present. There was no fatal case, so pathological lesions could not be studied.

*Variola louti* frequents the waters of Christmas, Palmyra, Wake, Society, Fanning and Apiang Islands, and near the Red Sea ; the *Serranus fascoguttatus* much the same area : Palmyra, Ponape, Gilbert, Marshall, Christmas, Tongo Reva and Fanning Islands. Both species belong to the Sea Bass or Grouper family and go by the local names of Hapapuu in Hawaii, Shakepan among the Chinese, and Ara among the Japanese. Whether the poison arises from substances on which the fish feed or on poisons developing at the spawning season is referred to, as it usually is in other papers dealing with this subject, but no definite conclusion is reached. *H. Harold Scott.*

SEHEULT, R. **Observations on the Incidence of Cancer in Trinidad.** *Caribbean Med. J.* 1945, v. 7, Nos. 2 & 3, 72–84.

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## GENERAL PROTOZOOLOGY.

JOHNSON, G., TRUSSELL, Margaret & JAHN, Frances. **Isolation of** *Trichomonas vaginalis* **with Penicillin.** *Science.* 1945, Aug. 3, 126–8. [Refs. in footnotes.]

The authors have worked out a technique for obtaining bacteria-free cultures of *Trichomonas vaginalis.* To 10 cc. of C.P.L.M. medium (cysteine, peptone, liver infusion, maltose and human serum) penicillin was added to a strength of 5,000 to 10,000 units per cc. To each tube was added two platinum loopfuls of vaginal discharge known to contain the flagellate. The tubes were then incubated for 60 hours at 37°C. At the end of this period transfer into the same medium without penicillin was carried out and further transfers were made every 40 to 44 hours. Bacteria-free cultures were obtained in this way from seven consecutive cases. In the early cultures the flagellates showed a tendency to grow in clumps, as did the first bacteria-free cultures isolated by TRUSSELL in 1939 (*J. Iowa State Med. Soc.*, 1940, v. 30, 66). As in his case, with repeated subculture the tendency to clumping was lost.

*C. M. Wenyon.*

HEATH, P. & ZUELZER, W. W. **Toxoplasmosis : Report of Ocular Findings in Infant Twins.** *Arch. Ophthalmology.* 1945, Mar., v. 33, No. 3, 184–91, 5 figs. [15 refs.]

Identical negro twins born prematurely at the eighth month were found to have been suffering from toxoplasmosis when a post mortem examination was made of one which died at the age of one month. The other was still alive at seven months. The infection, which must have occurred not later than the seventh month of gestation, had caused arrested development of the eyes, in which destruction of the young nerve tissue, causing bilateral choroidoretinitis, was detected. The post-mortem findings in the eyes of the twin that died and the ophthalmoscopic appearances of the eyes of the survivor as observed from

time to time are described in detail in the paper, which is a lengthy ophthalmological report on the cases. Sera from the surviving twin and the mother both contained neutralizing antibodies against toxoplasma as tested by Sabin's method. *C. M. Wenyon.*

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## GENERAL ENTOMOLOGY.

WIGGLESWORTH, V. B. **Transpiration through the Cuticle of Insects.** *J. Exper. Biol.* 1945, Aug., v. 21, Nos. 3 & 4, 97–114, 2 pls. & 6 text figs. [42 refs.]

The paper deals with the passage of water and other substances through the cuticle of insects, and with the lipoid materials which in some cases greatly reduce the water loss. The work is reviewed here in general terms to indicate the contribution which the insect physiologist is making to the understanding of some of the problems of medical entomology. It is important to us in two ways. In the first place, if the insect is to live in a relatively dry environment it must reduce the loss of water through its cuticle: its power to do so will influence its geographical and seasonal distribution and, therefore, the epidemiology of an infection which the insect transmits. But the subject is important also in a second direction, in relation to the passage of the contact insecticides through the surface of the insect.

It is already known that the insect cuticle is a very complex structure. The impediment to the loss of water from the insect's body is generally ascribed to the epicuticle (which contains no chitin and is not penetrated by pore canals): more precisely the reduction of loss of water is thought to be due to certain waxy substances on or in the epicuticle.

Wigglesworth enters the subject by studying the loss of water from a number of insects which live in different habitats. He works generally with insects killed by cyanide with the spiracles blocked and suspends them in dry air, weighing them at intervals, and he finds a striking contrast in the rate of loss of water in insects from different environments. For instance, one beetle larva which normally lives in moist soil loses water at a rate approximately the same as that of an open water surface, so that its cuticle offers almost no impediment to the outward passage of water. At the other end of the scale come insects with a very high resistance to desiccation and a much lower loss of water per unit area. It is also found that the rate of loss of water is a function of temperature though not directly so, for in many insects there is a critical temperature above which the water loss is greatly increased. In such an insect as the cockroach this critical temperature occurs at about 30 to 35°C. so that the insect might find itself living either above or below the critical temperature. But in other insects, which are more resistant to loss of water, the critical temperature is above 50°C.; that is, above any temperature at which the insect can live.

The loss of water from the larva and pupa of the blowfly, *Calliphora*, is interesting. In the larva, whether it is feeding or has emigrated from the meat, the critical temperature is about 35°C. and in the young puparium it is approximately identical. But in the puparium a few days old the critical temperature is much higher and there is a much greater resistance to the loss of water. This increased resistance is not due to the thick outer skin of the puparium but to the very delicate cuticle of the pupa itself, an indication of the importance of even the thinnest layer in reducing evaporation from the insect body.

Wigglesworth has also considered the effect of abrasive dusts on the wax films. It is already known that certain chemically inert mineral dusts are fatal to insects (indeed, the method is used in destroying pests under certain circumstances) and that the cause of death is desiccation. In the present paper it is shown that this desiccating effect occurs only with the living insect and particularly if it moves about so as to rub some parts of its body on a surface which has been dusted. For instance, the nymph of *Rhodnius* under certain atmospheric conditions loses about 2 per cent. of its weight in the twenty-four hours. If it is walking on filter paper which has been covered with a mineral dust and dragging its abdomen over that surface, the loss of weight may be increased ten or twenty-fold depending on the nature of the dust. But, if the underside of the abdomen is protected from contact with the dust the loss is only slightly greater than the normal. One may imitate this with the dead insect by rubbing parts of its body with abrasive substances. The fact that the abrasion actually removes the wax film is confirmed by dissecting off the cuticle and soaking it in ammoniated silver hydroxide. Where the wax film has been broken the under-lying polyphenols are stained black, but there is no blackening where the film is intact. In this ingenious way it is shown that an abrasion occurs not only where the body drags over a surface but also at articulations and other points where body surfaces rub on one another. This is illustrated by microphotographs.

It is interesting to learn that breaches in the wax film are repaired, and that this restores the impermeability to loss of water. This is associated with active changes in epidermal cells and emphasizes that insect cuticle is alive and that the control of loss of water is in no sense passive.

In a final section of the paper Wigglesworth describes experiments in which solvents and detergents are applied to the cuticle of various insects. His general conclusion is that the wax layer which overlies the epicuticle is further protected by a layer of cement. In the course of this work he was able to demonstrate that different types of detergents have different effects on the water-proof layers of the cuticle and that this is reflected in the rate of entry of insecticides. For instance, he secured capsules on the backs of nymphs of *Rhodnius* and in this way administered known doses of insecticides to known areas of cuticle. He found that nicotine in refined paraffin had almost no effect on the bug in two days: but the same dose applied in the cetyl ether of polyethylene glycol killed all nymphs in twenty-four hours. *P. A. Buxton.*

ALPATOV, V. V., NASTUKOVA, O. K. & KHARTULARI, E. M. [**Eggs of the Head and Body Forms of** *Pediculus humanus* **L. and their Variation associated with Conditions of Rearing.**] *Zoologicheskiĭ Zhurnal.* Moscow, 1945, v. 24, No. 1, 42–7. [In Russian.]

The exact status of the head and body forms of human lice (*Pediculus*) is not quite clear. Some workers have believed them to be separate species and others that they are merely modifications of a single species; a third opinion is that there is insufficient evidence to decide. An attempt to provide this evidence has been made by a biometric study of the eggs of the two forms.

CHOLODKOWSKY (*Zool. Anz.*, Leipzig, 1904, v. 28, 368–70, and *Vo.-med. Zh.*, 1916, Nov.–Dec.) first pointed out differences in the eggs of the two forms. TONKOVA, however, found differences as great between populations of each sort taken from different sources (*Izv. Akad. Nauk. S.S.S.R.* [*Bull. Acad. Sci. U.R.S.S.*], 1927, v. 21, 397–404). The present authors measured six dimensions of the louse egg and took the position of the egg-cement as a seventh character. On the basis of these measurements mean figures with standard errors are given

in tabular form, from which it seems quite clear that the eggs of head and body forms are recognizably distinct (judged by averages) in natural populations.

Body lice and head lice from natural sources were reared in boxes worn close to the human body and fed thrice daily on the skin of the arm. It was found that the eggs of body lice remained unchanged, but that the head lice strain laid eggs identical with the body form within five generations. Even the first generation eggs were very greatly modified towards the body type. Similar results were obtained with lice kept in a thermostat at 30°C. No explanation can be offered for the change : it may be due to selection or by inheritance of acquired characters. Temperature is suggested as the factor which may be responsible.

The significance of the possible change of head to body lice is obvious when it is considered how much more common the head form is, being relatively common even among cultured people. If conditions of hygiene deteriorated the head lice might set up a general body louse infestation, which would pave the way for a typhus epidemic. *J. R. Busvine.*

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## REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

WEST INDIES. **West India Royal Commission Report.** [Lord MOYNE, STUBBS, R. E., CROWDY, Rachel E., CITRINE, W., MACKINNON, P. G., BLACKLOCK, Mary G., ENGLEDOW, F. L. & HENDERSON, H. D.]. Cmd. 6607, pp. xviii+480, 1 folding map & 16 pls. 1945. June. London : H.M. Stationery Office. [7*s.* 6*d.*]

——. **West India Royal Commission 1938–39. Statement of Action taken on the Recommendations.** Cmd. 6656. 108 pp. 1945. June. London : H.M. Stationery Office. [2*s.*]

——. **Development and Welfare in the West Indies, 1943–44.** [STOCKDALE, Frank, K.C.M.G., C.B.E. (Comptroller for Development and Welfare in the West Indies]. Colonial No. 189, pp. iv+115. 1945. London : H.M. Stationery Office. [2*s.*]

This report (Cmd. 6607) makes gloomy reading. It gives an account of the West Indies from the time when slavery was established, through the period of emancipation and the 19th century, when the economic situation was grossly affected by the changes in world demand for the produce of the islands, to the position which existed immediately before the war. This position was bad, as was acknowledged by most of those competent to judge. Economically the islands were poor ; their produce did not bring in revenue sufficient to maintain the people at a satisfactory level of subsistence ; there was growing competition abroad ; the islanders, largely of African origin, had lost their old tribal organizations and standards, and these had not been replaced by any new, cohesive structure of society which would tend to satisfactory community life or individual dignity. The people relied for subsistence chiefly on the sale of their labour, and this was wanted at the cheapest rates and was needed, under the régime of 19th century economics, only in accordance with the fluctuations of general prosperity. Part-time labour of the cheapest kind was the general rule, existence being supported by the small holdings which a number of the people cultivated. The result was poverty, disease and waste of natural resources by inefficient farming, set in a background of ignorance and superstition. Yet the population has not ceased to increase, with consequent intensification of economic stress.

The diseases prevalent in these populations are those which would be expected in such circumstances. Malnutrition is general ; bowel diseases, helminthiasis, malaria, tuberculosis, leprosy, yaws and venereal diseases are the great problems. The arrangements for dealing with epidemics are fairly satisfactory, and no doubt the protection afforded in this matter has prevented a heavier disease incidence and mortality than has actually been experienced. Expenditure on medical services during three years before the war varied from 8·9 to 19·6 per cent. of the total expenditure of the different countries and islands ; the average proportion spent on medical services, therefore, has been reasonably in line with the proportions so spent in other countries. But the Commission comment unfavourably on the general tendency to spend too small a proportion on preventive measures and too great a proportion (but not, of course, too great an actual amount) on the curative services. They argue that since most of the ill-health of these Colonies is due to preventable disease, a greater proportion of medical effort should be devoted to prevention, with its possibility of long-term benefit, than has so far been the case. They admit, however, the difficulty a Director of Medical Services must have in diverting part of his limited funds from the improvement of the curative services, since pressure of public opinion is usually directed to means for the care of the sick, and the curative services themselves badly need extension. The Commission also comment that the reason why preventive measures are not more cultivated is partly that the education and experience of members of the medical staff have been directed chiefly to curative work and that some of them lack the preventive outlook, and partly that there is opposition by vested interests, " such as the owners of house property, to needed preventive measures." The Commission condemn the view, sometimes expressed, that it is useless to provide the people with good houses because they would convert the best of dwellings to the kind of slums they now inhabit. [To the reviewer this ignorant and thoughtless opinion (which usually is no more than a crude rationalization) is a social evil. The extreme examples of the concentration camps of Germany indicate that if men are treated like animals they tend to act like animals. The reverse, that good environment tends to produce desirable persons, is the basis of all social and educational work.]

Compared with some tropical countries, the West Indies are fairly well supplied with Government doctors, and with beds in Government hospitals, but the needs are not by any means fully met, so that more staff and more hospitals and other curative services are still demanded. There are many private practitioners, but their position is not easy.

The Commission made certain recommendations, for the appointment of a Medical Adviser for the whole area, for the unification of the medical services, for the centralization of the medical institutions, for the creation of a school of hygiene, for the development of long-term health policies, for the reorganization of the medical services and for an increase in certain preventive measures. Action was taken on these recommendations, and on the general recommendations relating to other than medical matters ; the details may be found in the Statement of Action Taken (Cmd. 6656), which was presented to Parliamant in June, 1945. The Report of Sir Frank Stockdale (Colonial No. 189) also describes the improvements which have been effected during 1943–44, even under the difficult conditions of war time.

To the reviewer it seems that hitherto the dominating force which has controlled the welfare of these people has been the commercial attitude. When trade was good they were comfortable, and when it was bad they were almost destitute ; but all the time trade was the deciding factor, and all the time the people were ignorant. The medical view of life is different. Medicine is concerned with human welfare, not because men are units of production, but

because they are human beings having the right to good health. It is no longer a principle of British government that colonies should be developed solely for the benefit of Britain or of big commercial interests, and the principle has been accepted that Native welfare is paramount. This being so, and good health, both physical and mental, being so cardinal a factor in human welfare, it seems evident that in the future the medical services should be given much greater prominence than ever before in the formulation of general political and industrial policies, and that the criterion which should determine action should be the needs of the people rather than their immediate capacity to produce. It is not, of course, denied that the capacity to produce is important, but medicine argues that one of the vital factors in efficient production is good health, and that the rest depends, within the limits of what is possible in the countries concerned, upon organization and education.

There are indications in these reports that the importance of Native welfare is seriously accepted as the leading principle of government.

*Charles Wilcocks.*

WEST INDIES. **West India Royal Commission. Report on Agriculture, Fisheries, Forestry and Veterinary Matters** [ENGLEDOW, F. L., C.M.G. (Drapers Professor of Agriculture, Cambridge University)]. Cmd. 6608. pp. viii+235. 1945. June. London: H.M. Stationery Office. [3s. 6d.]

This Report, which surveys the agricultural resources and needs of the West Indian Colonies, and discusses local problems of livestock and fishery developments, is supplementary to that of the West Indian Royal Commission (see above, Cmd. 6607) of which Professor F. L. Engledow was a member.

INDIA. **Annual Report of the Public Health Commissioner with the Government of India for 1941 and 1942** [COTTER, E.]. 63 pp., 1 folding map. 1944. Delhi: Manager of Publications. [Annas 12 or 1s.]

Owing to war conditions this Report, though it deals with two years of work, is less than half the size of the former annual reports. The mass of statistical matter that has been excluded will be published later.

Deaths from the diseases for which reasonably accurate statistics are available were :—

| | 1941 | 1942 | Average for 1936–1940 |
|---|---|---|---|
| Cholera ... ... | 228,141 | 218,496 | 135,723 |
| Smallpox ... | 59,307 | 27,137 | 64,088 |
| Plague ... ... | 11,984 | 10,577 | 20,923 |

Figures for deaths from malaria cannot be given, they form an unknown part of the total number of deaths from " fevers " of every kind, and diseases other than fevers are often included under this heading. The only areas in which malaria was exceptionally prevalent were the Punjab, Delhi Province, and the North West Frontier Province, in which epidemic conditions occurred in 1942. The epidemic in the Punjab followed a period of heavy rainfall in July and August so that the Annual Forecast was able to give timely warning, as a result of which arrangements were made in advance for dealing with the epidemic. The attendances at dispensaries in the Punjab during the year were more than two million ; in normal years they were less than one million. The deaths from " fevers " in the province rose from 528,633 in 1941 to 654,295 in 1942, and presumably the increase was due to malaria.

The number of births in India in 1941 was 9,425,671 ; the deaths were almost exactly three million fewer ; the per-mille figures were 32·1 and 21·8 respectively. In 1942 the births fell to 8,714,555, and the deaths to 6,336,313 ; the per-mille figures were 29·4 and 21·3. As the birth rate in India had remained steady at about 34 per mille for a number of years, the progressive fall since 1930 is regarded as " of particular interest in view of the world-wide discussions on what is regarded as the increasing population pressure in India and the alleged failure of food supplies to keep pace with it." [This remark seems to indicate that the author did not take a pessimistic view of the food situation, but it would seem desirable to make a close investigation into the " alleged failure," because the allegation has been made by highly responsible persons, including a Member of the Viceroy's Executive Council. The Central Advisory Board of Health, which held its fourth meeting in Calcutta in January 1942, did not discuss this problem, and apart from one or two brief references to research on nutrition the report makes no reference to the subject of food shortage as a public health question. This omission is not really surprising, because the prevention of disease caused by inadequate diet is usually regarded as being outside the scope of public health organizations.]

Inoculation against cholera has made rapid strides in recent years ; in 1941 about 13 million persons were inoculated in the provinces of India, including nearly 3½ million in Bengal. In 1942 4½ million inoculations were carried out in Madras and more than 3½ million in Bengal.

Inoculation against plague was on a smaller scale ; 600,000 persons were inoculated in 1941, mostly in Bombay, Madras, and the United Provinces. In 1942 the inoculations numbered less than 350,000 ; the reduction was chiefly in Bombay, where less than 20,000 inoculations were carried out, against 332,437 in 1941.

The incidence of enteric fevers in India is a matter of speculation ; even in the few areas in which the disease is a registrable cause of death the official figures give no indication of the real prevalence of the disease. [There is reason to believe that infection is so widespread that attacks in infancy and childhood confer a considerable degree of immunity on the adult population, hence the absence of epidemics on a large scale.]

The tuberculosis situation is also somewhat obscure ; surveys were carried out in a number of localities, and the Tuberculosis Association of India has continued to do active work in organizing research, relief, and teaching work in connexion with the disease. A model Tuberculosis Clinic was opened in New Delhi in 1941.

It is estimated that there are about one million lepers in India. Valuable work is being carried on by the India Council of the British Empire Leprosy Relief Association, and by the Mission to Lepers which cares for 10,000 in 47 homes and hospitals and for 1,000 healthy children of lepers who are segregated from their parents. The total indoor accommodation for lepers in India is 13,676 beds.

The defects of the system of registration of causes of death are exemplified by the figures for kala azar in 1941. The deaths registered in Bengal were 16,349, in Bihar 91, and in Assam 40, whereas the cases treated in medical institutions were 105,018 in Bengal, 119,465 in Bihar, and 16,470 in Assam. It is suggested that the deaths from the disease in Bihar are " probably registered under other causes."

The announcement by SWAMINATH, SHORTT, and ANDERSON in June, 1942 [this *Bulletin*, 1943, v. 40, 227], that kala azar had been transmitted to every one of six [five] volunteers by the bite of *Phlebotomus argentipes* is rightly described as a most important piece of work.

A brief account is given of the health activities of the Central and Provincial Public Health Departments. Five Health Units were operating in rural areas, each of which has a population of about 40,000 and the cost of each is about 30,000 rupees yearly. These units serve as demonstrations of the value of public-health services and as places of training for workers. The birth rates in two of them are stated, in one it averaged 47·7 and in the other 46·9.

Famine conditions persisted in the Hissar District of the Punjab in 1941; germinated grain was distributed to about 140,000 persons, and although the amount was only a little over two ounces twice weekly, a striking improvement in health is said to have resulted. In 1942 famine relief camps had to be opened in one district in Madras. During the two years measures for the relief of famine and scarcity were needed on a very small scale.

The provincial reports on health activities show that the war caused comparatively little interference. The report from Bengal contains no hint of premonition of the disastrous famine of 1943.

Maternity and child-welfare work obviously makes a special appeal to Indians. In Madras the expenditure on this by local bodies, excluding Madras City, was 560,000 rupees, about four times as much as in 1932. No less than four voluntary organizations in Bombay were carrying out a co-ordinated effort directed chiefly to child welfare.

The subject of medical research is dealt with in separate reports, but it is stated that the most serious curtailment due to the war was in malaria research. High hopes are entertained that the destruction of adult mosquitoes by spraying will make widespread control practicable.

In addition to the voluntary bodies already mentioned, the Indian Red Cross and the St. John Ambulance Association continued their peace-time activities, though most of their efforts were naturally directed to war work.

The Tuberculosis Association of India has opened a model Sanatorium at Kasauli and has considerably expanded its work of relief, propaganda, and the special training of medical men.

The Indian branch of the Ross Institute of Tropical Hygiene continued its valuable work of supplying expert advice and help to tea plantations and other industrial concerns.

[The production of this report in war time by the "contemptibly small" staff of the Public Health Commissioner's Office reflects great credit on Lt.-Col. COTTER and his assistants.

It is to be hoped that when Sir Joseph BHORE has completed his comprehensive report on health conditions in India the governments and peoples of that country will realize the urgent need for planning and carrying out a campaign directed against all the causes of preventable disease. Hitherto the basic preventable disease, malnutrition due to inadequate diet, has been practically excluded from the activities of public health departments except as a subject of research.] *John W. D. Megaw.*

YACOB, M. & SWAROOP, S. **Longevity and Old Age in the Punjab.** [Abridged.] *Brit. Med. J.* 1945, Sept. 29, 433–6, 3 charts.

The authors discuss certain aspects of longevity in the Punjab and conclude that "the study indicates that one of the urgent needs is the making of reproduction an easy and risk-free process."

The following statistics are of interest. In 1931 the expectation of life at birth in the Punjab was 28·05 years for males and 26·57 for females. For the whole of India the corresponding figures were 26·91 and 26·56.

During the five years, 1935–39, the average infant mortality rates in the Punjab were 172 for males and 157 for females. Up to the age of 10

years the death rate among females was rather lower than among males, but between the ages of 15 and 40 the deaths among females were considerably more numerous than among males—the rates were 30 for females and 24 for males.

The authors' comment on these figures is " in England the rate of maternal mortality is as low as 2 or 3 for 1,000 births ; in the Punjab it is generally believed to be from eight to ten times this figure." The absence of facilities for maternal relief and care, " coupled also perhaps with a rather unfavourable attitude towards the weaker sex in the Punjab, are responsible for keeping female longevity at so low a level." Female infanticide, though no longer practised in the province, is said to have persisted till comparatively recent times ; Sir James DOUIE is quoted as having stated in 1895 that " fifty years after Lawrence denounced the murder of female infants we are still discussing the best method of putting down that inhuman practice."

A graph is reproduced showing that from 1900 onwards the mortality rates among males and females have tended to decline.

[No reference is made to the part played by the marriage of immature girls in causing the deplorably high rates of infant and maternal mortality in the Punjab as well as in the rest of India.] *John W. D. Megaw.*

WESTERN SAMOA. **The Twenty-Second Report on the Administration of the Mandated Territory of Western Samoa, covering the Four Years from 1st April, 1941, to 31st March, 1945** [FRASER, P., Minister of Island Territories]. 17 pp., 1 chart. 1945. Wellington, New Zealand. [9*d.*]

The medical staff consists of three European medical officers, 22 Native medical practitioners, one European and four Native dental officers, one European dispenser, one bacteriologist (of part-Samoan descent), 11 European matrons or sisters, 95 Native nurses and 39 others. The hospital at Apia has a laboratory and X-ray department. In 1944 there were 3,538 admissions to hospital and 69,939 out-patients, and 425 major operations were performed.

The principal diseases are now :—filariasis, parasitic diseases (especially hookworm), typhoid, pneumonia, septic sores, pulmonary tuberculosis. Cases of meningococcal meningitis and dengue were also reported, in 1944, in considerable numbers. Infectious jaundice [? leptospirosis] is also reported. Infant mortality rates fluctuate considerably from year to year, according to the reported figures ; it is not clear how comprehensive the reporting is, but it is stated that in 1936 the heavy rate of 291·7 was due to epidemics of whooping cough and measles. The rates in 1943 and 1944 were 124·4 and 75·8 respectively. The total population as at March 31, 1945, was 66,761. *Charles Wilcocks.*

COOK ISLANDS. **Report of the Administration of the Government of the Cook Islands, including Niue for the Four Years ended 31st March, 1945** [FRASER, P., Minister of Island Territories]. 16 pp. 1945. Wellington, New Zealand. [6*d.*]

The medical staff consists of two European medical officers and six Native medical practitioners, four European sisters and 20 Native nurses, one European dental officer and two Native dental assistants. In 1944–45, for the population of 14,506, the health service expenditure was £12,724, representing 17*s.* 6*d.* per person. For the same year in-patients numbered 446 and out-patients 8,603, and 101 major operations were performed.

During four years there have been mild epidemics of influenza, chickenpox, measles and dysentery ; the most serious diseases are tuberculosis, filariasis

and leptospirosis. Figures for these are not given. Infant mortality rates vary very greatly from year to year, no doubt because the births registered are not numerous.

The health conditions of Lower Cook Islands and Northern Cook Islands are similar. At Niue there is a European medical officer, a Native medical practitioner, a European matron and three nurses. Of the infectious diseases, yaws appears to be the most prevalent, but filariasis is also common ; typhoid has occurred. Infectious jaundice [? leptospirosis] caused 78 cases in 1944.

*Charles Wilcocks.*

DEUTSCHMAN, Z. **Public Health and Medical Services in the Philippines.** Reprinted from *Far Eastern Quarterly.* 1945, Feb., 148–57. [12 refs.]

This short account of the medical services of the Philippines opens with a historical survey in which full justice is done to the extensive work carried out by the United States authorities until the inauguration of the Commonwealth, and to the efforts of the local administration after that date. During the present century the population has increased from 7½ millions to 16 millions, and during that period protection against the common epidemic diseases of the far east has been reasonably effective. Energetic administration has produced for these islands a more comprehensive system of medical care than exists in most countries of that region.

Immediately before the war the Bureau of Health included five divisions (Administration, Epidemiology, Hospitals and Dispensaries, Sanitation, and Maternity and Child Hygiene), and employed 680 doctors, 1,143 sanitary inspectors, 835 nurses, and other officials. There were 45 hospitals and 1,063 dispensaries, and certain clinics at which 281 physicians were employed. Campaigns for immunization and for construction of latrines (almost two million of these had been made by 1938) were in being. The total number of hospitals in 1938 was 160, providing bed accommodation at the rate of 0·76 beds per 1,000 population (U.S.A. 9·7 per 1,000) ; there were 4,909 licensed physicians (1 for 3,216 of the population, a very high rate for the far east), and 5,030 registered nurses. The numbers of dentists, pharmacists and midwives were also large. There are four medical schools.

With the increasingly effective control of smallpox, cholera and plague (the last of which has not occurred since 1914) the health problems are more of the sub-tropical than the tropical type, and the diseases concerned are tuberculosis (" the most important cause of death "), malaria (a disease of the foot-hills), leprosy and nutritional diseases. Steps have been taken to deal with these, but they are still serious problems.

*Charles Wilcocks.*

CORBYN, E. N. **The Pilgrimage to Mecca. Medical Care of Pilgrims from the Sudan.** *Lancet.* 1945, Oct. 6, 445–6.

In this short but interesting note the author describes the medical mission which accompanied the Sudan pilgrims to Mecca in 1944. On their route from all parts of Africa, the pilgrims pass through Suakin. In 1942, for the first time, a Sudanese doctor, himself a Moslem, accompanied the pilgrims to Mecca, and by 1944 the experience gained enabled the authorities to send a full mission consisting of two medical men, one medical assistant, one sanitary overseer and a hospital staff of seven (one a woman), one cook, one storekeeper and two ambulances with their drivers. A tented hospital of 30 beds was set up near Jedda, and dispensaries at Mecca and Medina. Sudan pilgrims only were admitted as in-patients to the hospital, but out-patient treatment was given to all who desired it.

The venture was a great success and much use of these medical facilities was made by the pilgrims; the total cost was about £5,000. Improved conditions in the camps at Suakin have added to the comfort of these travellers, some of whom may be away from their homes elsewhere in Africa for two years before completing their journey. *Charles Wilcocks.*

TEIXEIRA, Q. de A. Fiscalização sanitaria dos aeroportos. [**Sanitary Control of Airports.**] *Folha Med.* 1945, Apr. 25, May 5 & June 5, v. 26, Nos. 8, 9 & 11, 59–64; 67–72; 84–8.

This article may be regarded as a summary of lectures on aerodromes, aeroplanes and the health of their crews and passengers, and the measures to be taken to avoid transmission of disease by vectors, insect or human. These lectures form part of a course on Public Health at the Oswaldo Cruz Institute. Hence there is little here which lends itself to abstract since the whole is really devoted to pointing out the necessity for the rules which have been laid down and the dangers which would follow (and indeed have followed) neglect in carrying them out. Tables are given recording the insects found, dead or alive, in aeroplanes coming to Miami, Florida, in 1938 from Mexico, Trinidad, Porto Rico, Colombia, Venezuela and elsewhere. The average incubation periods of various infectious diseases are given, showing that all of them, or practically all, are longer than most flights, even long-distance, and so stressing the importance of careful examination of crews and passengers and adherence to the regulations of the Pan-American Bureau laid down in 1937. Disinfection of the aeroplane can be carried out during the flight, by means of a spray containing pyrethrum and carbon tetrachloride in kerosene [DDT receives no mention]. The regulations of the Argentine authorities for disinsectization of aircraft (Jan. 1943) are quoted in full, together with the apparatus to be carried and the details of procedure. The records for 1942 for the airports of Natal and Belém are given: 457 planes were disinfected, 452 at Natal, 5 at Belém, 4,194 arthropods were captured, of which 4,181 were harmless; of the remaining 13 the chief was *Anopheles gambiae.*

As regards passengers, the author favours the issue of a Sanitary Passport which gives a great deal of personal information and calls for vaccination against yellow fever, smallpox and enteric fever, a Wassermann test, blood examination for parasites, search for intestinal parasites, X-ray of the chest, bacteriological examination of the sputum, together with the identity card, place of residence for the week preceding embarkation and any history of recent contact with suspicious cases. *H. Harold Scott.*

NAPIER, L. E. **The Teaching of Tropical Medicine in the United States.** *Amer. J. Trop. Med.* 1945, May, v. 25, No. 3, 233–40.

The author begins by making the point that the teaching of tropical medicine, as part of the general medical course for undergraduates, has been neglected in the United States and in other countries. During the war, medical men have served in the tropics, and to equip them there have been instituted short courses of admittedly insufficient scope. In the next few years, moreover, there must inevitably be the problem of the returned service man who will need in his own home the attention of local medical men for diseases with which they are not familiar. Temporary arrangements have been made for the teaching of the present generation of undergraduates, but these, though probably the best under existing circumstances, are not ideal.

The author's suggestion is that a broader teaching in systematic parasitology and tropical diseases (including nutritional diseases) should be integrated into the general medical curriculum, and that these subjects should not be

segregated from the rest of the course. The preventable nature of most tropical diseases should commend the teaching of them to the public health instructors. In this way the "purely artificial barrier that exists today between tropical and temperate medicine" would be broken down. The study of tropical diseases would contribute much to the general understanding of medicine.

For the training of medical men who propose to practise in the tropics special schools are needed, and these should be instituted in connexion with the large medical schools, preferably those in seaports. For the United States three such schools are needed at first. A comprehensive syllabus is suggested, covering a course lasting 8 or 9 months, with about 1,000 hours of instruction.

*Charles Wilcocks.*

MITCHELL, J. P. **Medical Education in Uganda.** *South African Med. J.* 1945, July 28, v. 19, No. 14, 242–5.

The author traces the course of medical education in Uganda from the days when the epidemic of syphilis demanded the instruction of Natives in the simpler principles of diagnosis and treatment, to the present time, when the Mulago medical school educates selected Africans, through a 6-year course, to a stage at which they are competent to take charge of hospital and to perform major surgical operations. The details of the story need not be recounted here, but the author's conclusions, drawn from his own long experience of these Africans during their training and after qualification, are important. He has no doubt of their capacity to do well the work for which they are trained, though he admits that for some time they will need guidance, and that teaching and research will continue to demand the best European officers, but he is confident that the success of Mulago indicates that the same principles can be widely extended throughout Africa.

"During the war we have had many distinguished medical visitors. All have expressed surprise that the African is capable of attaining the higher intellectual levels of the European. Only those who have worked for years with them appreciate that they can. Moreover, I am frequently told that we are dealing with a more highly civilized African than is found elsewhere. We used to think so ourselves, but we were mistaken. East Africans, other than the Baganda, have shown that, given similar opportunities, they can not only keep pace with the Baganda but outstrip them. And I would emphasise that they are the same people as I have seen all the way through Africa in my journey south."

Mitchell pays tribute to the enthusiasm of those who have been selected from the European medical staff to carry out this training.

*Charles Wilcocks.*

JOHNSON, M. S. **Rodent Control on Midway Islands.** *U.S. Nav. Med. Bull.* 1945, Aug., v. 45, No. 2, 384–98.

The Midway Islands (Sand Island and Eastern Island), in the North Pacific Ocean, have no native mammals, but mice and rats have been recently introduced and have multiplied greatly. Rats were first noticed in March 1943; they have entirely destroyed two species of birds, the Laysan rail and the Laysan finch, have nearly exterminated the canaries, and have no doubt reduced the numbers of other species of the island birds. They enter stores and other buildings but live mostly out of doors and commonly in the burrows of the Bonin Island petrel, known as the "small moaning bird," whose eggs and young they eat.

So far only two species of rat have become established, *Rattus rattus rattus* and *R. r. alexandrinus*, the latter being three times as numerous as the former; no part of the islands is free from them but they are most numerous in bush-covered ground and here most of the petrel burrows are found.

The use of poisoned bait seems to be the only effective method of control. Experiments with various kinds of bait and poison were made and are described in detail; the poisons tried included squill, "Antu" (3 per cent. alpha-naphthylthiourea) and zinc phosphide, the last being the best. The aim is to cover the entire area of the islands by sections, the minimal requirement being that each section should be baited for one month out of every three; pans containing bait are placed about 100 feet apart (4 to the acre), and unpoisoned and poisoned bait are put in them alternately, the former for 8–10 days and the latter for 3–4 days. The bait consists of maize meal, 14,000; peanut butter, 500; cottonseed (cooking) oil, 350; brown sugar, 500; and milk powder, 250 parts respectively; the poison is a mixture of zinc phosphide 2 parts and calcium carbonate 1 part, and is added in such amount that the bait will contain 0·75 per cent. of zinc phosphide.

In built-up areas traps should also be used and buildings should be made rat-proof. It is important to try to prevent the establishment of the Norway rat and to prevent the introduction of diseased rats, and for this purpose poisoned bait and traps are used in the dock areas.

The results already obtained indicate that the rats could be much reduced in numbers but not exterminated by these methods. *J. F. Corson.*

TANGANYIKA TERRITORY, DAR ES SALAAM. SURVEY DIVISION. DEPARTMENT OF LANDS & MINES. **Atlas of the Tanganyika Territory.** With Foreword by H. P. ROWE (Chief Surveyor, Director of Civil Aviation and Controller of Aerodromes). 29 pp. 1942. Dec. [50s.]

The Survey Division of the Department of Lands and Mines and those who collaborated with them are to be congratulated on an admirable feat of cartography in the production of this atlas. The features which it is desired to display in the various maps are very easily and clearly appreciated by the reader; there is no fumbling in the drawing, and the paper is of fine quality.

The maps (on 29 pages each measuring 17½ in. × 17½ in.) show the physical features, rainfall, temperature, etc., but for readers of this *Bulletin*, particularly interesting are those which show the distribution of tsetse and sleeping sickness, malaria, medical facilities, population and communications. An attractive feature is the Historical Section in which maps dating from the time of Homer to the end of the XIX century are reproduced. At the end is a map of the routes taken by some of the European explorers, beautifully drawn.

*Charles Wilcocks.*

HADDOW, A. J. **On the Mosquitoes of Bwamba County, Uganda: I. Description of Bwamba, with special reference to Mosquito Ecology.** *Proc. Zool. Soc. London.* 1945, Oct., v. 115, Pts. I & II, 1–13, 2 figs. [26 refs.]

The isolation of the yellow fever virus from a human case and from *Aëdes* (*Stegomyia*) *simpsoni* Theo. in Bwamba County, Western Uganda, in 1941 led to the beginning of an intensive mosquito survey of the area in 1942. This survey is still proceeding and results obtained so far are discussed in Part II of this paper (below).

Part I is concerned with a description of the topography and vegetation of the area, the zoogeography of the mosquito fauna and the behaviour of mosquitoes in forest areas.

Bwamba lies in the extreme west of Uganda bordering on the Belgian Congo; except for one road constructed in 1939 it is almost cut off from the rest of Uganda. Most of the work was done in the lowland forest area bounded by the rivers Lamia and Semliki and by the Ruwenzori mountains. Population is sparse on the mountain slopes and grassy plains but rather more dense in the cultivated strip running along the foothills. This fertile area is crossed by mountain streams running in deep gorges. The lower Semliki forest, which is closed to native settlement, is liable to flooding from these streams and from the Semliki river itself.

The interior of the forest area under British administration is described for the first time; some of the facts recorded in passing are of particular interest. For example, the larvae of some tree-hole-breeding mosquitoes occur in the rot-holes in soft wooded figs and in the pools enclosed in their buttress roots, but not in the water held in the fallen leaf bracts of the umbrella tree (*Musanga smithii* R. Br.). Outside the forest, fig and *Cassia* plantations are the haunts of tree-hole breeders.

The forest climate is warm and fairly equable; the highest temperature recorded was 36·5°C. (98°F.) and the lowest 12·0°C. (53°F.) after a hailstorm, but temperatures rarely fall below 15°C. (59°F.). Humidity is high and approaches saturation during the cooler parts of the day. Annual rainfall is 50–60 inches occurring mainly in two rainy seasons, the vernal and autumnal equinoxes, but even in the drier seasons there is enough rain to maintain a high population of mosquitoes.

The general aspects of mosquito distribution are briefly discussed and the conclusion is reached that faunistically the area has strong western affinities. To improve our knowledge of this aspect of medical entomology the importance of carefully compiled locality records needs to be emphasized.

In the concluding section some unusual features of mosquito ecology are discussed, the author taking *Aëdes* (*Stegomyia*) *aegypti* (L.) and *Anopheles* (*Myzomyia*) *gambiae* Giles as examples. Though these two species are commonly regarded as house frequenters and as preferring human blood, the author has rarely taken *Aëdes aegypti* biting man in Bwamba. Of 50,000 wild-caught mosquitoes taken in the act of biting man only five were *Aëdes aegypti* and no adults have been taken in the neighbourhood of huts. Larvae of *Aëdes aegypti* occur to some extent in domestic receptacles but more frequently they are found in tree-holes. This species has been collected from the axils of plants also, even though large earthenware pots partly filled with water were available.

There is no doubt that *Anopheles gambiae* is the main vector of malaria in Bwamba and that the disease is associated with huts, but the greatest concentration of this anopheline was found in the forest along the banks of the Semliki River, though most of the area is uninhabited and the nearest settlements are six miles away through dense forest.

Knowledge of the bionomics of forest mosquitoes is at present too inadequate to say what is or is not normal behaviour, but in Bwamba these two species, far from being domestic and anthropophilic, seem to be largely sylvatic and zoophilic. *H. S. Leeson.*

HADDOW, A. J. **The Mosquitoes of Bwamba County, Uganda. II, Biting Activity with special reference to the Influence of Microclimate.** *Bull. Entom. Res.* 1945, July, v. 36, Pt. 1, 33–73, 9 figs. [14 refs.]

Part I of this paper contained a description of the area in which the work is taking place. Part II discusses various field studies in detail.

The entomological survey is still proceeding and up to date more than 63,000 mosquitoes have been collected, belonging to more than thirty-six species. Descriptions are given of the methods employed and the equipment used, and analysis is made of the results. They are based on the records of continuous catches over 24-hour periods in and near forest and banana plantations. Climatic and light conditions in these places and in the open are compared and their relation to movement and biting habits of the mosquitoes are considered.

A vast amount of information about these mosquitoes has thus been accumulated, but special attention is paid to *Aëdes simpsoni* which is the only vector of yellow fever so far incriminated in Bwamba. It is almost exclusively diurnal in habit, and bites most actively on humid days. It usually has two peaks of activity, one in the morning and the other late in the afternoon. Observations in different parts of a banana plantation showed that this species made up 96 per cent. of the total catch and occurred most frequently in the thinner parts. In exposed situations it rarely bites and then only near bananas or other vegetation. A favourite harbourage is a maize field alongside a banana plantation. It penetrates forest for short distances only. Catches made in a native plantation from four types of bait yielded *A. simpsoni* alone and showed that human blood was preferred. Two two-hour catches, for example, gave the following results :—On a naked child, 58 females (61 per cent.) ; on six fowls, 23 females (24 per cent.) ; on two kids, 12 females (13 per cent.) and on two young baboons, 2 females (2 per cent.). In other experiments with human baits it was shown that *A. simpsoni* prefers standing to sitting baits, and sitting to lying baits, and that it particularly selects the head and shoulders.

With regard to the other mosquitoes, a finding which the authors think may also have a bearing on the epidemiology of yellow fever, concerns the movement of forest mosquitoes into banana plantations by night. *Aëdes longipalpis*, *Aëdes apicoargenteus* and *Aëdes africanus*, for example, are tree-hole breeders and the last species particularly has been shown to be an effective laboratory transmitter of yellow fever [this *Bulletin*, 1929, v. 26, 1005]. It seems likely that while man-to-man infection in Bwamba is almost certainly to be attributed to *Aëdes simpsoni*, animal-to-man transmission may probably be by forest mosquito.

The paper contains a wealth of information derived from carefully observed experiments, recorded and discussed in detail. *H. S. Leeson.*

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## BOOK REVIEWS.

INDIA. **Famine Inquiry Commission. Report on Bengal** [WOODHEAD, John Chairman]. pp. iv+236, 2 charts (1 folding). [1945].

This is a Report of the Commission whose five members were appointed by the Government of India to enquire into the distressing famine which is estimated to have caused the death of about a million and a half persons in Bengal during the second half of 1943 and the first half of 1944. The Chairman was Sir John WOODHEAD, a very able retired member of the Indian Civil Service, who already had an intimate knowledge of conditions in Bengal ; Dr. AYKROYD, the well-known authority on nutrition, represented the medical profession, and the other three members were distinguished Indians.

In the course of the enquiry 285 persons were interviewed, 129 in Calcutta, the rest in New Delhi, Bombay, Madras, The Central Provinces, Travancore, and Cochin.

The Commissioners point out that "The detailed story which has to be told and our critical reviews do not lend themselves readily to summarization." The same limitations apply to anyone who attempts to review this tragic report.

Since the terrible famine in 1769–70, in which 10 million of a population of 30 million are said to have died, Bengal had been almost entirely free from famine till 1943. For more than 40 years India as a whole had escaped from great famines; these had come to be regarded by many as things of the past, so that the sight of thousands of victims of starvation in the streets of Calcutta "came as a great shock to the public in India." The Commission estimated that the absolute shortage of the rice supply available in Bengal in 1943 was "of the order of three-weeks' requirements"; this was a surprisingly small deficit in view of the widespread starvation that resulted. The Commission believed that the shortage of rice and the disturbed conditions due to the war would not have caused a disastrous famine if the Governments of Bengal and India had taken resolute action at an early stage to ensure equitable distribution of the available supply. Equal blame is attributed to certain sections of the public of Bengal; an atmosphere of greed and panic caused a rise in prices to levels which placed rice beyond the reach of the poorer classes. It was estimated that every death in the famine "was balanced by, roughly, 1,000, rupees of excess profit" acquired by the dealers in rice. There was also widespread corruption and "a moral and social breakdown on the part of some sections of the community."

Less than two pages out of the 107 in the first part of the report are allotted to a description of "the background against which the events which led to widespread starvation in 1943 must be viewed," but these pages are of outstanding importance because they contain a clear statement of the basic causes of the famine as opposed to the causes that precipitated the tragedy; they show that the people of Bengal and of many other parts of India were becoming progressively more vulnerable to the effects of any temporary reduction in the food supply.

It is stated that 7½ million families in Bengal are wholly or mainly dependent on agriculture for their livelihood, that less than 2 million of these hold more than 5 acres each, and that about one-half of them hold less than 2 acres or own no land at all. The general consensus of opinion, endorsed by the Land Revenue Commission of Bengal, is that 5 acres would be the minimum area required to keep the average family in reasonable comfort, and that for some types of land 8 acres would be needed.

As evidence of the previous nutritional condition of the people the commissioners quote the findings of the reviewer, who in 1933 carried out a rough but illuminating survey of certain aspects of life in rural India. This survey was based on the personal observations and opinions of large numbers of dispensary doctors in agricultural villages. These findings are regarded by the Commission as "indicating in a general way the unsatisfactory state of nutritition of the people of rural Bengal 10 years previous to the famine." The doctors in Bengal reported that only 22 per cent. of the population were well nourished and that 31 per cent. were very badly nourished. The following further opinions are expressed on this subject:—"Poverty and malnutrition left a section of the population with few reserves, material or physical, to meet superimposed calamity. For them there was no 'margin of safety' and little possibility of 'tightening the belt.' The fact that such conditions are common to most other provinces of India, which escaped the famine, does not detract from their fundamental importance. Agricultural production was not keeping pace with the growth of population. A considerable section of the population was living on the margin of distress."

In a separate Minute Mr. M. Afzal Husain, one of the commissioners, states that since 1933 there has been no increase in food production, but a steep rise in population ; he quotes Dr. Aykroyd as having estimated in 1943 that for India as a whole there is at all times serious under-nourishment of about one-third of the population, and goes on to ask why no attention was paid to the warnings given by numerous investigators on economic, agricultural, medical, and nutritional problems.

The second part of the Report deals with death and disease ; the official figures show that in the second half of 1943 the number of deaths exceeded the quinquennial average by nearly 700,000 and in the first half of 1944 the excess was over 422,000. These figures are admittedly unreliable. In the worst areas 10 per cent. of the people died, but all over the province the death rate was much higher than normal. Deaths among infants under one year of age were 26·8 per cent. fewer than normal ; this surprising reduction was due chiefly to a fall in the live-birth rate which fell from 28 to 18·8 per mille ; but here again the registration of births and deaths is likely to have been more inaccurate than usual.

The mortality curve followed the same general trend as in normal years, reaching its highest point in December, but of course the level was much higher. In May and June 1943, the death rate in the province had already risen to a considerable degree ; from September to December it rose steeply. In the early stages of the famine a high proportion of the deaths resulted from starvation ; later on, epidemic diseases, especially malaria and cholera, were the actual causes of most of the deaths.

Vitamin-deficiency diseases and pneumonia were far less frequent than had been expected. The medical aspects of death from starvation are being investigated separately so that little is said of them in the Report.

The quinine situation was extraordinary : in November 1943, about 43,000 pounds of quinine were available in Bengal, but distribution was exceedingly difficult ; the price on the black market was R.300 a pound so that supplies had to be sent under armed escort to the districts. In spite of this precaution the Director of Public Health stated publicly in December 1943, that " a vast amount of the quinine issued by Government had gone into the black market." Eventually quinine and mepacrine became available throughout the province. In 1943, 79,000 pounds of quinine and 20,000 pounds of cinchona febrifuge were allotted to Bengal ; in 1944, 65,000 pounds of quinine, 30,000 pounds of cinchona febrifuge, half a million ampoules of quinine, and 382 million tablets of mepacrine were supplied. Large quantities of sulphaguanidine and vitamin preparations, including a million capsules of halibut-liver-oil presented by Boots Pure Drug Co., were distributed.

Vaccination against smallpox and inoculation against cholera were carried out on a huge scale, especially during the first half of 1944 when more than 23 million persons were vaccinated and more than 11½ million were inoculated.

The last part of the Report deals with food-administration and rehabilitation ; there is a chapter on protective and supplementary foods : it is stated that more meat, fish, eggs, and milk are badly needed. The high cost of these articles is mentioned, but nothing is said about the practical difficulty arising from the fact that a much larger acreage of land is needed to provide a family with a well-balanced diet than to supply enough rice or other cereals to satisfy hunger.

The medical-relief and public-health services of the province are severely criticized for their failure to take effective action during the early stages of the famine, when much could have been done to save the situation. The medical personnel had not been severely depleted by war conditions except

for the withdrawal of most of the few members of the Indian Medical Service and Indian Medical Department still remaining in Bengal.

The District Health Officers were poorly qualified and poorly paid servants of the District Boards. The standards of efficiency of the medical officers in general are said to have "left much to be desired; discipline and sense of duty were deficient, and morale low."

In pleasing contrast was the efficiency of the medical and public health officers lent by the army in November 1943; these men by their example and precept at once stimulated the subordinate staff to "unwonted activity."

Special praise is given to the young Indian Medical Officers; the excellence of their work is said to have been a striking testimonial to the value of their military training.

The formation of a provincial cadre of District Health Officers is stated to be an immediate necessity. The control of these officers by local bodies is regarded as being largely responsible for their failure.

[This remarkably frank and outspoken Report deals exhaustively with the circumstances which precipitated the famine in Bengal. Surprisingly little space has been allotted to the basic conditions—referred to as the "background"—which rendered Bengal so susceptible to famine that a relatively small shortage of the normal food supply was enough to cause the tragedy. The significance of these conditions has not been overlooked by the Commission, who describe them as being of fundamental importance and add the ominous comment that they are common to most of the other provinces of India. It can, therefore, be expected that this aspect of the problem will receive full consideration in the further report dealing with the second part of the terms of reference, which is:—"The development of agriculture and the raising of the standards of nutrition so as to make recurrence of famine impossible." In this term of reference the Commission has been asked to find a solution for the greatest of all the problems that affect the lives and health, not only of the people of Bengal and the rest of India, but also of more than half the population of the whole world.

The solution would be simple if the inhabitants of the overcrowded countries could be induced to take into account the rigid principle that the greatest quantity of food that can be provided will not be enough for an unlimited number of persons. In these countries reproduction is allowed to occur at the natural rate, and this is so high that, apart from the checks imposed by premature deaths due to the preventable diseases caused by infection and dietetic malnutrition, the population would double and redouble itself every 25–30 years.

It follows that if complete success is to be achieved in the control of infectious diseases and in securing freedom from want, and if at the same time no check is applied to the natural birth rate, it will be necessary to provide for a corresponding increase in the food supply. In Bengal, for example, where an immediate increase in the food supply by 50 per cent. is needed, it would be necessary to provide this and a further progressive increase reaching three times the present amount by the end of 25–30 years. Six times the present supply would be needed 50–60 years hence, and so on.

It is true that some experts have suggested that when people are well fed and comfortable their reproductive capacity automatically declines and therefore there is no need to expect any undue increase in the population. This view finds no support from actual experience of what happens in India where the birth rate is highest in those parts of the country in which food is most plentiful.

Obviously then, in the absence of control of the number of births, the balance of population and food supply in the overpopulated countries must be maintained through the slaughter of the surplus population by infectious

diseases or malnutrition. Normally in such countries both of these factors co-operate in a very effective manner.

The balance can be maintained at a pitiably low economic level, as happens in the countries in which the average duration of life is less than half as long as it might be ; or it can be maintained at a high level of health and comfort as in the countries in which the control of infectious diseases goes hand in hand with the control of the birth rate, whether by celibacy, delayed marriage, or the use of contraceptives. The last of these methods has created a new problem, race suicide, but the impoverished countries will have ample time to devise safeguards against this eventuality.

The Bengal famine deserves the closest study by all public health workers in overpopulated countries ; it shows that a one-sided policy directed solely towards the control of infectious diseases must fail unless it is accompanied by action to ensure an adequate supply of food.

The task that lies ahead of health organizations in these countries is infinitely more difficult and complicated than the one successfully accomplished in progressive countries whose inhabitants have themselves dealt with the food and population problem and so have provided conditions in which the control of infection has achieved astonishing success.] *John W. D. Megaw.*

COLONIAL OFFICE. **Report of the Committee on the Training of Nurses for the Colonies** [RUSHCLIFFE, Chairman]. Cmd. 6672. 65 pp., 1 diagram. 1945, Aug. London : H.M. Stationery Office. [1*s*.]

In November 1943 the Secretary of State for the Colonies set up a Committee under the chairmanship of Lord Rushcliffe " to examine the question of training, both in this country and overseas, for nurses who are to serve in Colonial territories, and to make recommendations having regard also to the need in those territories for increased public health activities and for the fostering and developing of community welfare."

The Committee was composed of members with special knowledge and experience of the training of nurses in Britain and also of those with special knowledge of the colonial requirements.

The report, which was published in August 1945, is an eminently practical document not only making general recommendations but also giving many detailed suggestions as to how these recommendations might be carried out.

In the main body of the report are given—firstly, accounts of the history and present position of nursing in the Colonies and of the general medical policy there ; secondly, recommendations on how training of local nurses might be provided in the Colonies and on how the training of nurses in Britain might be organized so as to enable them to fulfil their task of developing the local nursing services satisfactorily ; thirdly, suggestions as to how the recruitment of nurses might be improved and the conditions of service for nurses made more attractive.

In the appendices, examples are given of types of legislation and of methods of organization which have been found useful in Britain or in some of the Colonies. Detailed syllabuses for the training of different types of nurses are included. These should prove useful, not necessarily for complete adoption but as suggestions for local development. The Committee emphasizes throughout the report the need for research into the most suitable methods of training to suit the local conditions.

The first recommendation in the report is that " Representative Nursing Councils and Midwives' Councils (or possibly, a joint Nursing and Midwives' Council) should be set up in each Colonial territory or group of territories." These are for the purpose of controlling and guiding the ordered advancement

of the standards of nursing by means comparable to those adopted by such statutory bodies as the General Nursing Council for England and Wales and the Central Midwives' Board. These Councils would have the duty, among others, of maintaining Registers of Nurses and Midwives.

The second recommendation is that "Nurses recruited in the Colonies should be trained locally in training schools." An account is then given of the types of training school required, but the Committee add "Colonial nurses who after qualification show special aptitude, should be given every facility for taking post-registration courses in this country or the Dominions."

It is considered that the minimum period of training for admission to the Register of Nurses should be four years, of which the first three should be devoted to "basic training." In the syllabus suggested for this basic training a thorough and well supervised training in medical and surgical nursing is advocated, but emphasis is also laid on the need for study, throughout the course, of the preventive and social aspects of nursing.

The fourth year of training should be spent in gaining additional experience, either in hospital, or in midwifery, or by taking a community nursing course. The term "Community Nurse" is used in the report to describe the type of nurse who works outside the hospital among the people, and whose duties are of a dual nature, combining those of a Health Visitor and a District Nurse. It is considered that this type of nurse should be of great value in the Colonies where so many of the people live in rural areas and where so much educative work in health matters is required.

Other points to be noted are :—The recommendations that Assistant Nurses should be trained and registered in the more advanced Colonies; that in backward areas, especially in Colonies where two standards of education exist, two grades of nurses should be trained, the aim being to use the lower grade nurses for work among their own peoples, and to raise the standard of training year by year up to the higher grade. In training these nurses the combined efforts of educational and nursing teachers are required. Throughout the report this need for close co-operation between the educational and medical departments is stressed, and the interesting suggestion is made that "as an experiment there might well be set up joint training colleges of residential type, comprising student nurses and student teachers and possibly other vocational students."

In the section dealing with the preparation of nurses in the United Kingdom and the Dominions for work in the Colonies, the Committee recommend that all candidates selected for posts in the Colonial Nursing Service should be given a special course of instruction to equip them more adequately for service in Colonial conditions. This course, it is thought, should be of about three months' duration, and a very detailed syllabus for such a course is given. The Committee state that they would welcome any increase in the preventive outlook during training of nurses in Britain.

The report ends with a useful summary of the main recommendations.

*Mary G. Blacklock.*

SIMMONS, James Stevens [B.S., M.D., Ph.D., Dr. P.H., Sc.D. (Hon.), etc.], WHAYNE, Tom F. [A.B., M.D., etc.], ANDERSON, Gaylord West [A.B., M.D., Dr. P.H.], HORACK, Harold Maclachlan [B.S., M.D., etc.] & Collaborators. **Global Epidemiology. A Geography of Disease and Sanitation. Volume 1. Part 1 : India and the Far East. Part 2 : The Pacific Area.** pp. xxvi+504, 32 maps. 1944. London : William Heinemann, Ltd. [30*s*.] [Review appears also in *Bulletin of Hygiene*.]

Experience of war, especially of war in tropical countries, has always shown that one of the chief difficulties of a commander is the maintenance of the health of his troops. Examples need not be multiplied, but the notorious

records come to mind—the Walcheren expedition of 1809, the French occupation of Haiti in 1800, the Crimean war, the Gallipoli, Macedonia and Mesopotamia campaigns of 1914–18. In the war which has recently ended, troops have been sent to some of the most unhealthy parts of the world, and disease incidence has not been low, but in most of the campaigns, though there have been some surprises, not least of which has been scrub typhus, the military authorities have at least known what the risks were. Steps were taken to acquire in advance knowledge of the diseases indigenous to the areas to which troops were moved. In the United States a large number of medical men and women were associated with the Intelligence Revision of the Office of the Surgeon General of the United States Army, and these collected a considerable amount of information, either from personal experience of the countries concerned, or by the laborious process of consulting reports or papers in the world medical literature. The reports they made have been brought together, and in this volume those dealing with India and the Far East, and with the Pacific Area, are now published. The editors remark that the authors do not regard this work as final. They would have preferred to delay publication until scrutiny under the more leisurely conditions of peace could have been carried out, but have consented to publication at this time because so much of the material is of immediate value to many interests, and is not readily available elsewhere.

The countries described are :—*India and the Far East.*—Burma, Ceylon, China, Formosa, Indo-China, India, Japan, Korea, British Malaya, Nampo and Ryukyu Islands, Thailand. *The Pacific Area.*—Australia, Cook Islands and Niue, Easter Island, Fiji, French Oceania, Gilbert, Ellice, Ocean and Nauru Islands, Guam, Hawaii, Japanese Mandated Islands, Johnston Island and Northern Line Islands, Netherlands East Indies, New Caledonia, New Hebrides, New Zealand, North Borneo, Sarawak and Brunei, Papua, New Guinea and the Bismarck Archipelago, Philippines, Phoenix Islands, Pitcairn, Samoa, Solomons, Tokelau and the Tonga Islands.

In each case notes are given of the climate, the health services and medical facilities, and the common diseases. There is a bibliography for each section, and, at the end, a series of world maps showing the distribution of certain diseases. The general index is good.

It is evident that information of this kind has as great a value in peace as in war. No similar publication on this scale has previously been issued, and though, no doubt, in future an even greater amount of detail will be required, the information now made available will be welcomed. It may, perhaps, stimulate some countries from which annual medical reports are not now issued, to contribute regularly, after the fashion set by others who do so report, to the orderly mass of world medical information. Volumes of this kind soon become out of date, and the issue of new editions at reasonably frequent intervals will be a task for the future.

The reviewer has had some experience of the labour of compiling reports of this kind [see the reports on the Far East in this *Bulletin*, 1944, August to December], and this entitles him to say that this American team has done its work well. *Charles Wilcocks.*

MEYER-MAY, J. with the collaboration of HO-DAC-DI, VU-DINH-TUNG, TONG-THAT-TUNG & DINH-VAN-THANG. Chirurgie tropicale d'urgence. [**Urgent Surgery in the Tropics.**] Préface de M. le Professeur MONDOR. pp. vi+286, 9 coloured pls. & 16 figs. 1940. Paris : Masson & Cie, Editeurs, 120 Boulevard Saint-Germain. [20s.]

This work, published in 1940, is based on the author's experience whilst Professor of Surgery at the Medical School at Hanoi in Tonking, from 1936 to

1938. During these three years, 1,144 urgent abdominal operations were performed, 353 of which are reviewed in this book as being of special interest to the surgeon practising in the tropics. Some of the conditions dealt with, such as cholecystitis with perforation, perforated gastric and duodenal ulcer, regional ileitis and others, do not differ materially from the same diseases as met with in Europe, though often modified by the poor physical condition of the patient, the debilitating effects of malaria or dysentery, and the fact that at least 70 per cent. of the Tonkingese harbour intestinal parasites. Under such conditions a recovery rate of 57·4 per cent. for 54 cases of gastro-duodenal ulcer and 95 per cent. for the 19 operated within the first 12 hours is very creditable to the surgeon, so too is a survival rate of 26 per cent. in 42 operations for perforated typhoid ulcer. Only those cases of hepatic abscess which required open operation for urgent peritoneal symptoms are described, 16 out of 100 cases. The grave outlook in perforation of dysenteric ulcers is shown by the fact that six out of seven cases were fatal. The account of the clinical signs is very helpful and it is pointed out that in cases of localized abscess, which invariably occurs around the caecum and may be mistaken for an appendix abscess, the persistence of a faecal fistula should lead to suspicion of the real cause, even if a recrudescence of the dysenteric symptoms and the finding of the amoeba has not already made it clear. Thirty-two cases of operation for rupture of the enlarged spleen are described, 20 of them urgent cases operated within 24 hours with nine deaths, the remaining 12 had less urgent symptoms and there were only three deaths among them ; the ambiguity of the physical signs in many cases is emphasized. A chapter on ascariasis and several on gynaecological conditions close the book.

Every chapter contains summaries of illustrative cases and the discussions of the pathology and clinical investigations will be of interest and value to surgeons. The book may, in fact, be regarded as a series of clinical lectures rather than as a textbook. The printing is excellent and the coloured plates are a credit to the artist in Indo-China who executed them. *W. L. Harnett.*

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